

# Hitachi Advanced Server HA820

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## User Guide

This document is for the person who installs, administers, and troubleshoots servers and storage systems. Hitachi Vantara assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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## Preface

This document is for the person who installs, administers, and troubleshoots servers and storage systems. Hitachi Vantara assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

Please read this document carefully to understand how to use these products, and maintain a copy for your reference.

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**Thank you!**

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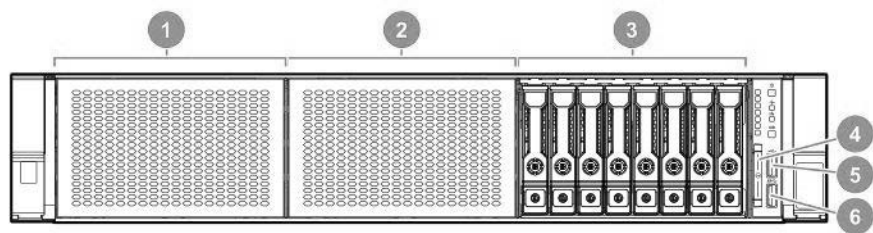
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# Component identification

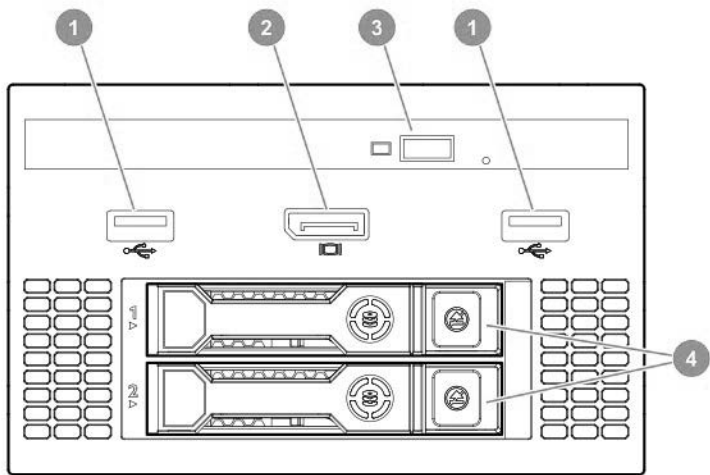
## Front panel components

### SFF front panel components



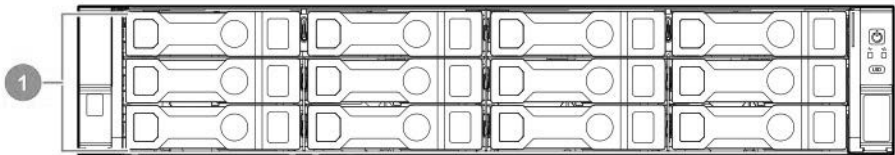
Item	Description
1	Box 1 (optional drives or <u>universal media bay</u> )
2	Box 2 (optional drives)
3	Box 3 Drives 1-8
4	Serial label pull tab or optional <u>Systems Insight Display</u>
5	iLO service port
6	USB 3.0 port

### Universal media bay components



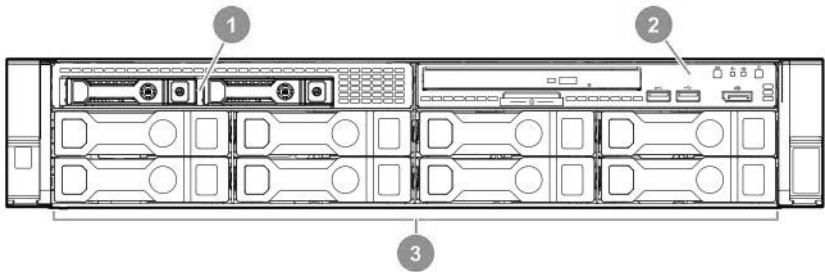
Item	Description
1	USB 2.0 port
2	Video display port
3	Optical disc drive (optional)
4	Drives (optional)

12-drive LFF front panel components



Item	Description
1	Drive bays

drive LFF model front panel components

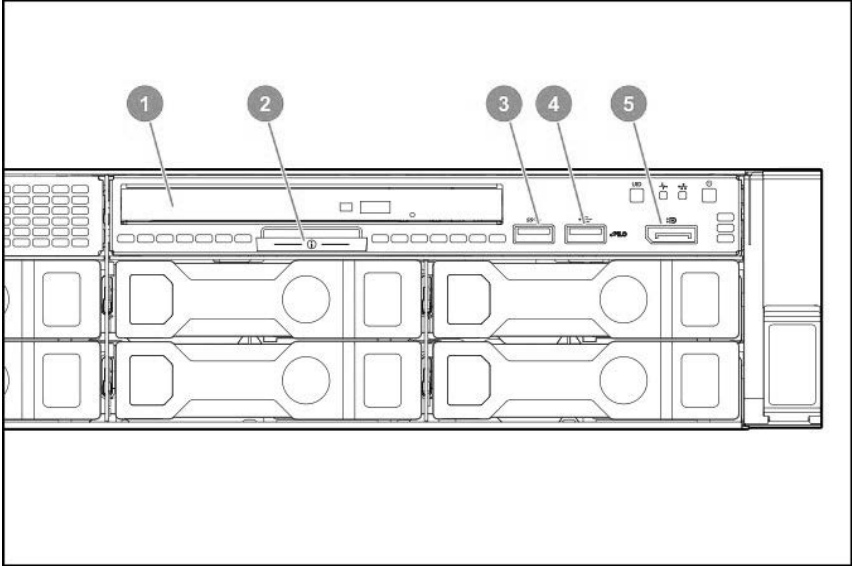


Item	Description
1	Drives (optional)

LFF power switch module

2	Drive bays
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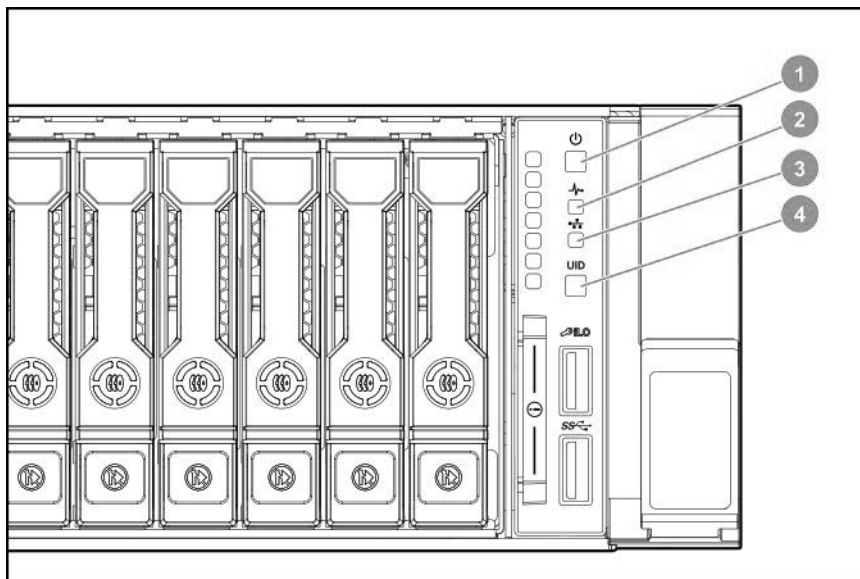
LFF power switch module components



Item	Description
1	Optical disk drive
2	Serial label pull tab
3	USB 3.0 port
4	iLO service port
5	Video display port

## Front panel LEDs and buttons

### SFF front panel LEDs and button



Item	Description	Status
1	Power On/Standby button and system power LED*	<p>Solid green = System on</p> <p>Flashing green (1 Hz/cycle per sec) = Performing power on sequence</p> <p>Solid amber = System in standby</p> <p>Off = No power present†</p>
2	Health LED*	<p>Solid green = Normal</p> <p>Flashing green (1 Hz/cycle per sec) = iLO is rebooting</p> <p>Flashing amber = System degraded</p> <p>Flashing red (1 Hz/cycle per sec) = System critical**</p>

*Table Continued*

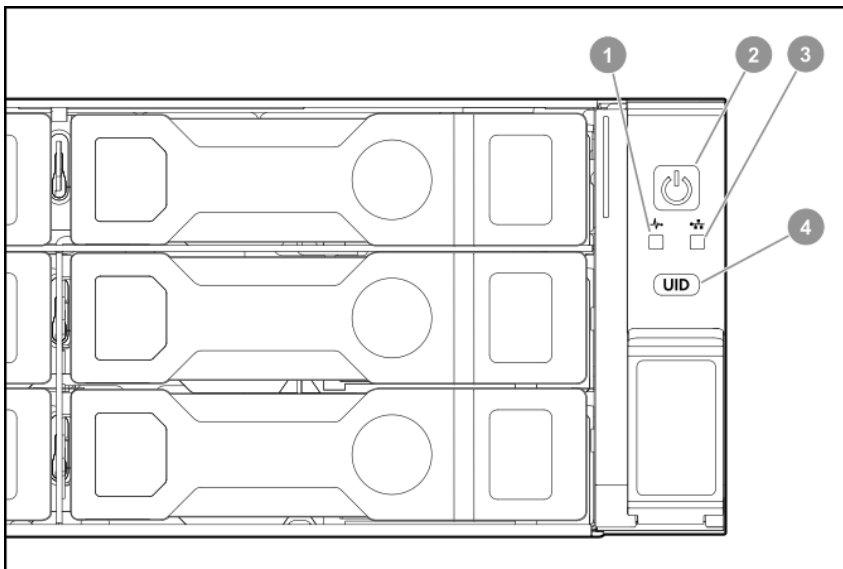
Item	Description	Status
3	NIC status LED*	Solid green = Link to network  Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
4	UID button/LED*	Solid blue = Activated  Flashing blue: <ul style="list-style-type: none"> <li>1 Hz/cycle per sec = Remote management or firmware upgrade in progress</li> <li>4 Hz/cycle per sec = iLO manual reboot sequence initiated</li> <li>8 Hz/cycle per sec = iLO manual reboot sequence in progress</li> </ul> Off = Deactivated

\*When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see **"Power fault LEDs."**

\*\*If the health LED indicates a degraded or critical state, use iLO to review the system health status.

†Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.

## LFF 12-drive model front panel LEDs and button



Item	Description	Status
1	Health LED*	Solid green = Normal  Flashing green (1 Hz/cycle per sec) = iLO is rebooting Flashing amber = System degraded  Flashing red (1 Hz/cycle per sec) = System critical**
2	Power On/Standby button and system power LED*	Solid green = System on  Flashing green (1 Hz/cycle per sec) = Performing power on sequence  Solid amber = System in standby  Off = No power present†
3	NIC status LED*	Solid green = Link to network  Flashing green (1 Hz/cycle per sec) = Network active  Off = No network activity
4	UID button/LED*	Solid blue =  Activated Flashing blue:  <ul style="list-style-type: none"> <li>• 1 Hz/cycle per sec = Remote management or firmware upgrade in progress</li> <li>• 4 Hz/cycle per sec = iLO manual reboot sequence initiated</li> <li>• 8 Hz/cycle per sec = iLO manual reboot sequence in progress</li> </ul> Off = Deactivated

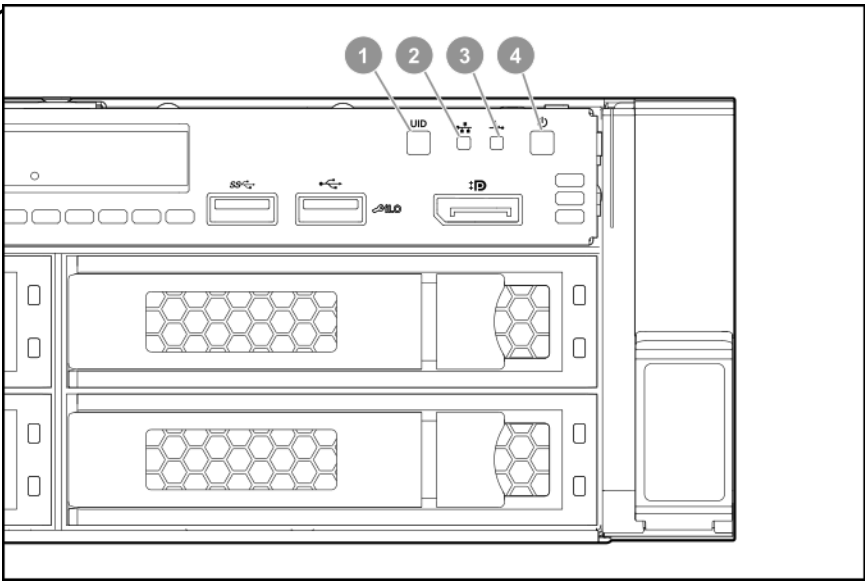
\*When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see "**Power fault LEDs.**"

\*\*If the health LED indicates a degraded or critical state, use iLO to review the system health status.

†Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.



LFF power switch module LEDs and button



Item	Description	Status
1	UID button/LED*	<p>Solid blue = Activated</p> <p>Flashing blue:</p> <ul style="list-style-type: none"><li>• 1 Hz/cycle per sec = Remote management or firmware upgrade in progress</li><li>• 4 Hz/cycle per sec = iLO manual reboot sequence initiated</li><li>• 8 Hz/cycle per sec = iLO manual reboot sequence in progress</li></ul> <p>Off = Deactivated</p>
2	NIC status LED*	<p>Solid green = Link to network</p> <p>Flashing green (1 Hz/cycle per sec) = Network active</p> <p>Off = No network activity</p>
3	Health LED*	<p>Solid green = Normal</p> <p>Flashing green (1 Hz/cycle per sec) = iLO is rebooting</p> <p>Flashing amber = System degraded</p> <p>Flashing red (1 Hz/cycle per sec) = System critical**</p>
4	Power On/Standby button and system power LED*	<p>Solid green = System on</p> <p>Flashing green (1 Hz/cycle per sec) = Performing power on sequence</p> <p>Solid amber = System in standby</p> <p>Off = No power present†</p>



Description	Status
Processor LEDs	Off = Normal Amber = Failed processor
DIMM LEDs	Off = Normal Amber = Failed DIMM or configuration issue
Fan LEDs	Off = Normal Amber = Failed fan or missing fan
NIC LEDs <sup>1</sup>	Off = No link to network Solid green = Network link Flashing green = Network link with activity If power is off, the front panel LED is not active. For status, see <a href="#">Rear panel LEDs</a> .
Power supply LEDs	Off = Normal Solid amber = Power subsystem degraded, power supply failure, or input power lost.
PCI riser LED	Off = Normal Amber = Incorrectly installed PCI riser cage
Over temp LED	Off = Normal Amber = High system temperature detected
Amp Status LED	Off = AMP modes disabled Solid green = AMP mode enabled Solid amber = Failover Flashing amber = Invalid configuration
Power cap LED	Off = System is in standby, or no cap is set. Solid green = Power cap applied

<sup>1</sup> For Networking Choice server models, the embedded NIC ports are not equipped on the server. Therefore, the NIC LEDs on the Systems Insight Display will flash based on the FlexibleLOM network port activity. In the case of a dual-port FlexibleLOM, only NIC LED 1 and 2 will illuminate to correspond with the activity of the respective network ports.

When the health LED on the front panel illuminates either amber or red, the server is experiencing a health event. For more information on the combination of these LEDs, see [Systems Insight Display combined LED descriptions](#).

## Systems Insight Display combined LED descriptions

The combined illumination of the following LEDs indicates a system condition:

- Systems Insight Display LEDs
- System power LED
- Health LED

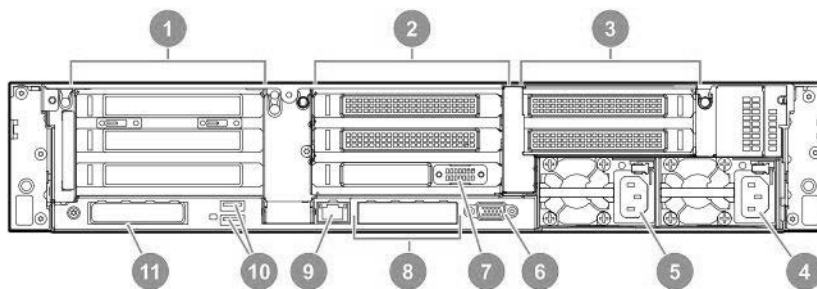
Systems Insight Display LED and color	Health LED power	System LED	Status
Processor (amber)	Red	Amber	One or more of the following conditions might exist: <ul style="list-style-type: none"> <li>• Processor in socket X has failed.</li> <li>• Processor X is not installed in the socket.</li> <li>• Processor X is unsupported.</li> <li>• ROM detects a failed processor during POST.</li> </ul>
Processor (amber)	Amber	Green	Processor in socket X is in a pre-failure condition.
DIMM (amber)	Red	Green	One or more DIMMs have failed.
DIMM (amber)	Amber	Green	DIMM in slot X is in a pre-failure
Over temp (amber)	Amber	Green	The Health Driver has detected a cautionary temperature
Over temp (amber)	Red	Amber	The server has detected a hardware critical temperature level.
PCI riser (amber)	Red	Green	The PCI riser cage is not seated properly.
Fan (amber)	Amber	Green	One fan has failed or has been removed.
Fan (amber)	Red	Green	Two or more fans have failed or been removed.
Power supply (amber)	Red	Amber	One or more of the following conditions might exist: <ul style="list-style-type: none"> <li>• Only one power supply is installed and that power supply is in standby.</li> <li>• Power supply fault.</li> <li>• System board fault.</li> </ul>

*Table Continued*

Systems Insight Display LED and color	Health LED power	System LED	Status
Power supply (amber)	Amber	Green	One or more of the following conditions might exist: <ul style="list-style-type: none"> <li>Redundant power supply is installed and only one power supply is functional.</li> <li>AC power cord is not plugged into redundant power supply.</li> <li>Redundant power supply fault.</li> <li>Power supply mismatch at POST or power supply mismatch through hot- plug addition.</li> </ul>
Power cap (off)	—	Amber	Standby.
Power cap (green)	—	Flashing green	Waiting for power.
Power cap (green)	—	Green	Power is available.
Power cap (flashing amber)	—	Amber	Power is not available.

**! IMPORTANT:** If more than one DIMM slot LED is illuminated, further troubleshooting is required. Test each bank of DIMMs by removing all other DIMMs. Isolate the failed DIMM by replacing each DIMM in a bank with a known working DIMM.

## Rear panel components



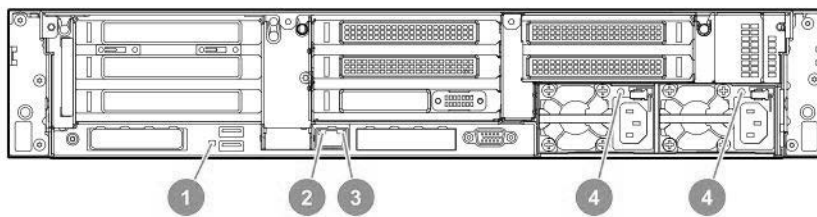
Item	Description
1	Primary riser slots 1-3 (Optional drive cage)
2	Optional riser slots 4-6 (Optional drive cage)
3	Optional riser slots 7-8 (Optional drive cage)
4	Power supply 1
5	Power supply 2
6	Video port

Table

Item	Description
7	Serial port (optional)*
8	1Gb RJ-45 ports 1–4 (if equipped)
9	iLO management port
10	USB 3.0 ports
11	FlexibleLOM slot

\*When a tertiary riser cage is installed as shown, the serial port can be installed in riser slot 6.

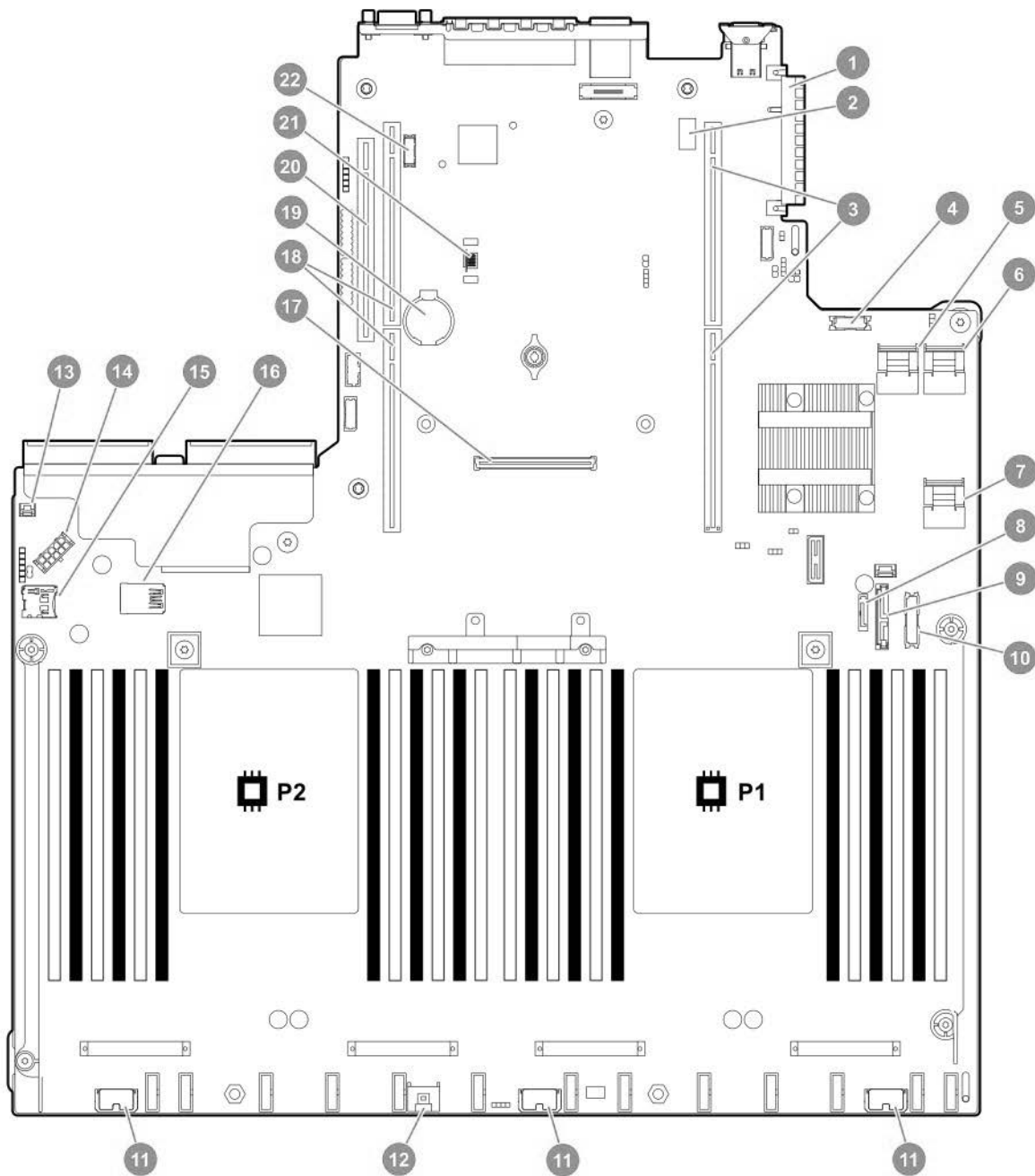
## Rear panel LEDs



Item	Description	Status
1	UID LED	Off = Deactivated Solid blue = Activated Flashing blue = System being managed remotely
2	Link LED	Off = No network link link Green = Network link
3	Activity LED	Off = No network activity Solid green = Link to network Flashing green = Network activity
4	Power supply LEDs	Off = System is off or power supply has failed. Solid green = Normal

Table

# System board components



Item	Description
1	FlexibleLOM connector
2	System maintenance switch
3	Primary PCIe riser connector
4	Front display port/USB 2.0 connector
5	x4 SATA port 1
6	x4 SATA port 2

7	x2 SATA port 3
8	x1 SATA port 4
9	Optical disk drive/SATA port 5
10	Power switch/SID module connector
11	Drive backplane power connectors
12	Energy pack connector
13	Chassis intrusion detection connector
14	Drive backplane power connector
15	microSD card slot
16	Dual internal USB 3.0 ports
17	Type-a smart array connector
18	Secondary PCIe riser connector*
19	System battery
20	Tertiary PCIe riser connector*
21	TPM connector
22	Serial port connector (optional)

\* Requires a second processor

## System maintenance switch descriptions

Position	Default	Function
S1 <sup>1</sup>	Off	Off = iLO security is enabled. On = iLO security is disabled.
S2	Off	Reserved
S3	Off	Reserved
S4	Off	Reserved
S5 <sup>1</sup>	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6 <sup>1, 2, 3</sup>	Off	Off = No function On = Restore default manufacturing settings
S7	Off	Reserved



Position	Default	Function
S8	—	Reserved
S9	—	Reserved
S10	—	Reserved
S11	—	Reserved
S12	—	Reserved

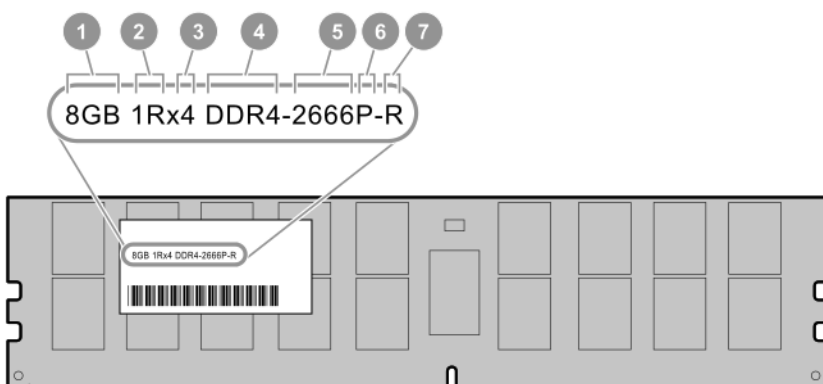
<sup>1</sup> To access the redundant ROM, set S1, S5, and S6 to On.

<sup>2</sup> When the system maintenance switch position 6 is set to the On position, the system is prepared to restore all configuration settings to their manufacturing defaults.

<sup>3</sup> When the system maintenance switch position 6 is set to the On position and Secure Boot is enabled, some configurations cannot be restored. For more information, see [Secure Boot](#).

## DIMM label identification

To determine DIMM characteristics, see the label attached to the DIMM. The information in this section helps you to use the label to locate specific information about the DIMM.



Item	Description	Example
1	Capacity	8 GB  16 GB 32 GB 64 GB 128 GB
2	Rank	1R = Single rank  2R = Dual rank 4R = Quad rank 8R = Octal rank

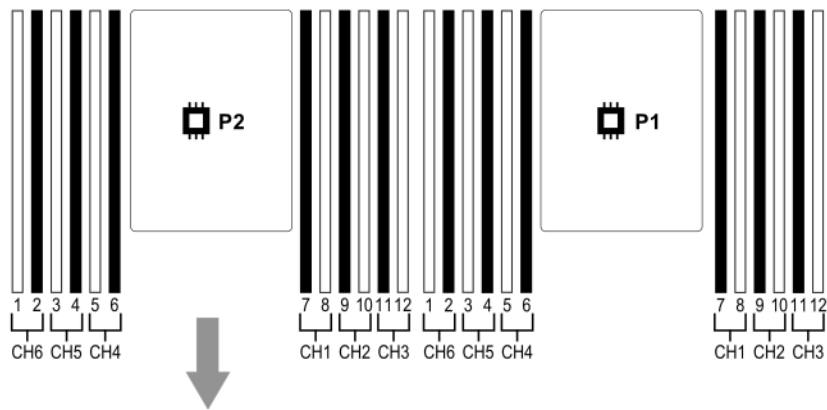
Table Continued

Item	Description	Example
------	-------------	---------

3	Data width on DRAM	x4 = 4-bit x8 = 8-bit x16 = 16-bit
4	Memory generation	PC4 = DDR4
5	Maximum memory speed	2133 MT/s 2400 MT/s 2666 MT/s 2933 MT/s
6	CAS latency	P = CAS 15-15-15 T = CAS 17-17-17 U = CAS 20-18-18 V = CAS 19-19-19 (for RDIMM, LRDIMM) V = CAS 22-19-19 (for 3DS TSV LRDIMM) Y = CAS 21-21-21 (for RDIMM, LRDIMM) Y = CAS 24-21-21 (for 3DS TSV LRDIMM)
7	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced) E = Unbuffered ECC (UDIMM)

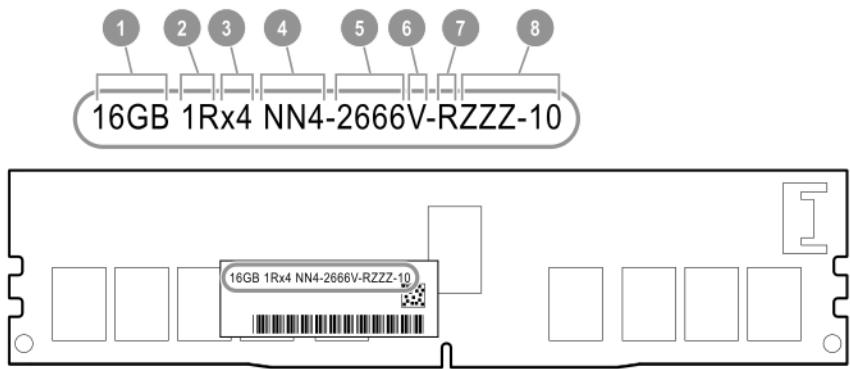
DIMM slot locations

DIMM slots are numbered sequentially (1 through 12) for each processor.



NVDIMM identification

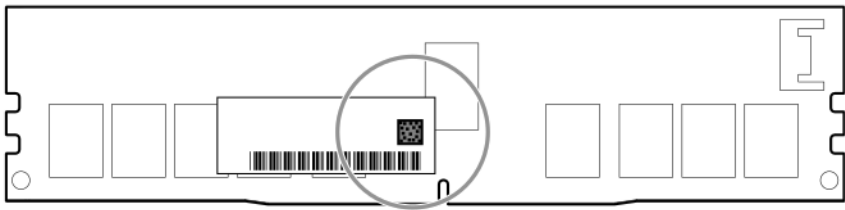
NVDIMMs are supported only when first-generation Intel Xeon Scalable processors are installed on the server. NVDIMM boards are blue instead of green. This change to the color makes it easier to distinguish NVDIMMs from DIMMs. To determine NVDIMM characteristics, see the full product description as shown in the following example:



Item	Description	Definition
1	Capacity	16 GiB
2	Rank	1R (Single rank)
3	Data width per DRAM chip	x4 (4 bit)
4	Memory type	NN4=DDR4 NVDIMM-N
5	Maximum memory speed	2667 MT/s
6	Speed grade	V (latency 19-19-19)
7	DIMM type	RDIMM (registered)
8	Other	—

NVDIMM 2D Data Matrix barcode

The 2D Data Matrix barcode is on the right side of the NVDIMM label and can be scanned by a cell phone or other device.

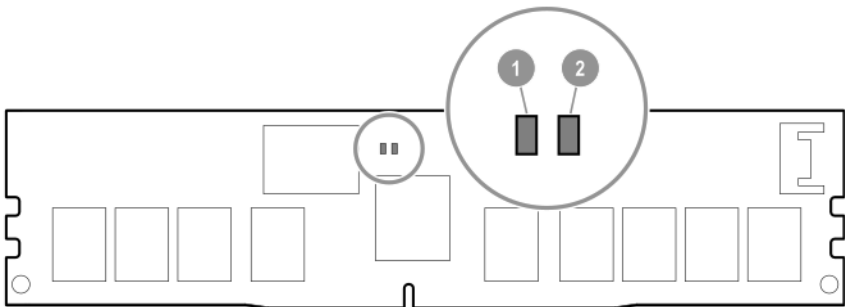


When scanned, the following information from the label can be copied to your cell phone or device:

- (P) is the module part number.
- (L) is the technical details shown on the label.
- (S) is the module serial number.

Example: (P)HMN82GR7AFR4N-VK (L)16GB 1Rx4 NN4-2666V-RZZZ-10(S)80AD-01-1742-11AED5C2

NVDIMM LED identification



Item	LED description	LED color
1	Power LED	Green
2	Function LED	Blue

NVDIMM-N LED combinations

State	Definition	NVDIMM-N Power LED (green)	NVDIMM-N Function LED (blue)
0	AC power is on (12V rail) but the NVM controller is not working or not ready.	On	Off
1	AC power is on (12V rail) and the NVM controller is ready.	On	On
2	AC power is off or the battery is off (12V rail off).	Off	Off
3	AC power is on (12V rail) or the battery is on (12V rail) and the NVDIMM-N is active (backup and restore).	On	Flashing

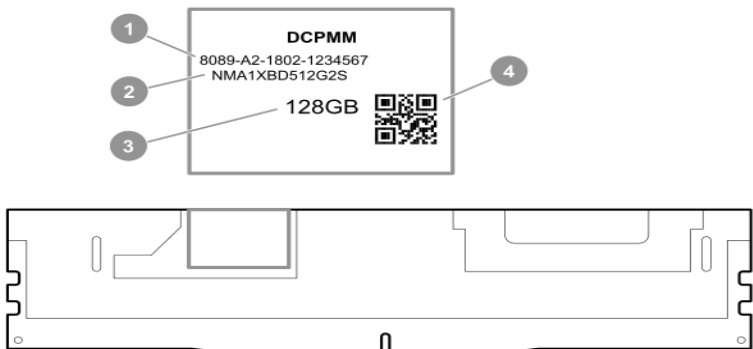
### NVDIMM Function LED patterns

For the purpose of this table, the NVDIMM-N LED operates as follows:

- Solid indicates that the LED remains in the on state.
- Flashing indicates that the LED is on for 2 seconds and off for 1 second.
- Fast-flashing indicates that the LED is on for 300 ms and off for 300 ms.

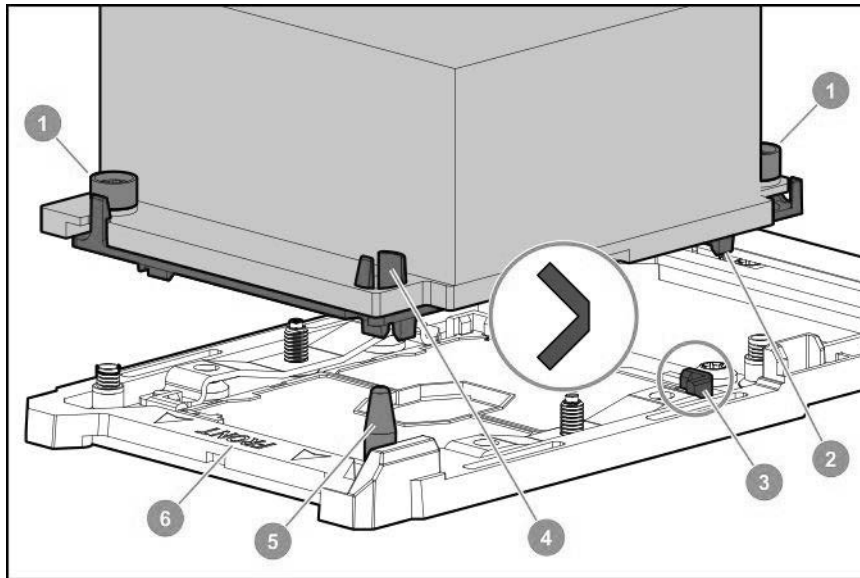
State	Definition	NVDIMM-N Function LED
0	The restore operation is in progress.	Flashing
1	The restore operation is successful.	Solid or On
2	Erase is in progress.	Flashing
3	The erase operation is successful.	Solid or On
4	The NVDIMM-N is armed, and the NVDIMM-N is in normal operation.	Solid or On
5	The save operation is in progress.	Flashing
6	The NVDIMM-N finished saving and battery is still turned on (12 V still powered).	Solid or On
7	The NVDIMM-N has an internal error, or a firmware update is in progress. For more information about an NVDIMM-N internal error, contact customer support.	Fast-flashing

### Persistent Memory module label identification



Item	Description	Example
1	Unique ID number	8089-A2-1802-1234567
2	Model number	NMA1XBD512G2S
3	Capacity	128 GB 256 GB 512 GB
4	QR code	Includes part number and serial number

## Processor, heatsink, and socket components



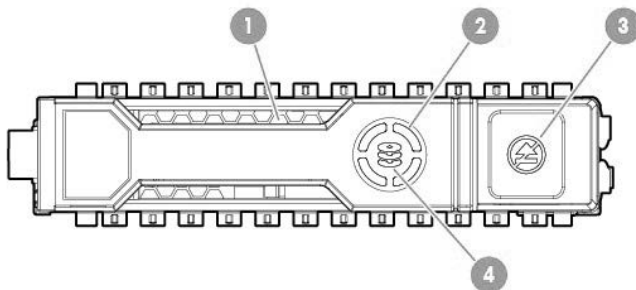
Item	Description
------	-------------

1	Heatsink nuts
2	Processor carrier
3	Pin 1 indicator <sup>1</sup>
4	Heatsink guide/keying feature
5	Alignment post
6	Heatsink keying frame

<sup>1</sup> Symbol also on the processor and frame.

## Drives

### SAS/SATA drive components and LEDs

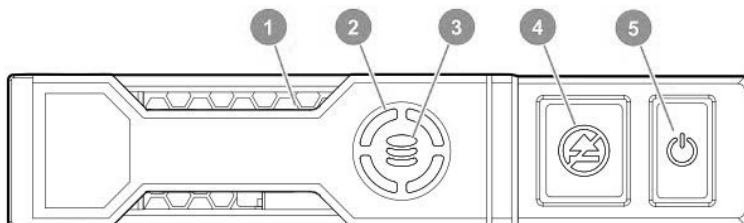


Item	Description	Status
1	Locate	<ul style="list-style-type: none"> <li>• Solid blue = The drive is being identified by a host application.</li> <li>• Flashing blue = The drive carrier firmware is being updated or requires an update.</li> </ul>
2	Activity ring LED	<ul style="list-style-type: none"> <li>• Rotating green = Drive activity.</li> <li>• Off = No drive activity.</li> </ul>
3	Do not remove LED	<ul style="list-style-type: none"> <li>• Solid white = Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.</li> <li>• Off = Removing the drive does not cause a logical drive to fail.</li> </ul>
4	Drive status LED	<ul style="list-style-type: none"> <li>• Solid green = The drive is a member of one or more logical drives.</li> <li>• Flashing green = The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.</li> <li>• Flashing amber/green = The drive is a member of one or more logical drives and predicts the drive will</li> <li>• Flashing amber = The drive is not configured and predicts the drive will fail.</li> <li>• Solid amber = The drive has failed.</li> <li>• Off = The drive is not configured by a RAID controller.</li> </ul>

## NVMe SSD LED definitions

The NVMe SSD is a PCIe bus device. A device attached to a PCIe bus cannot be removed without allowing the device and bus to complete and cease the signal/traffic flow.

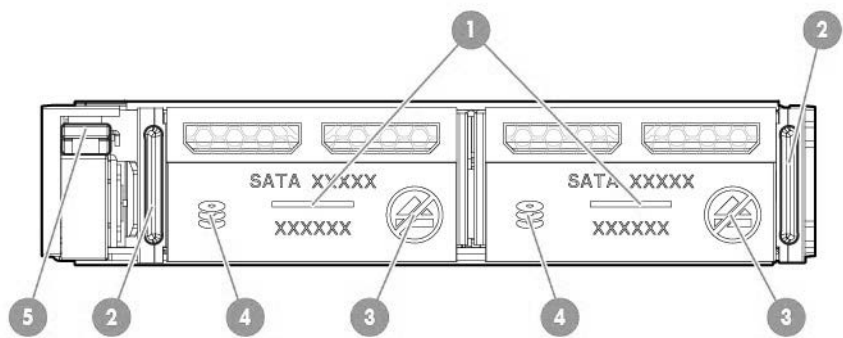
**⚠ CAUTION:** Do not remove an NVMe SSD from the drive bay while the Do not remove LED is flashing. The Do not remove LED flashes to indicate that the device is still in use. Removing the NVMe SSD before the device has completed and ceased signal/traffic flow can cause loss of data.



Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is doing one of the following: <ul style="list-style-type: none"> <li>• Rebuilding</li> <li>• Performing a RAID migration</li> <li>• Performing a stripe size migration</li> <li>• Performing a capacity expansion</li> <li>• Performing a logical drive extension</li> <li>• Erasing</li> </ul>
		Flashing amber/ green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will
		fail. Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.
4	Do not remove	Solid white	Do not remove the drive. The drive must be ejected from the PCIe bus prior to removal.
		Flashing white	The drive ejection request is
		pending. Off	The drive has been ejected.
5	Power	Solid green	Do not remove the drive. The drive must be ejected from the PCIe bus prior to removal.
		Flashing green	The drive ejection request is
		pending. Off	The drive has been ejected.

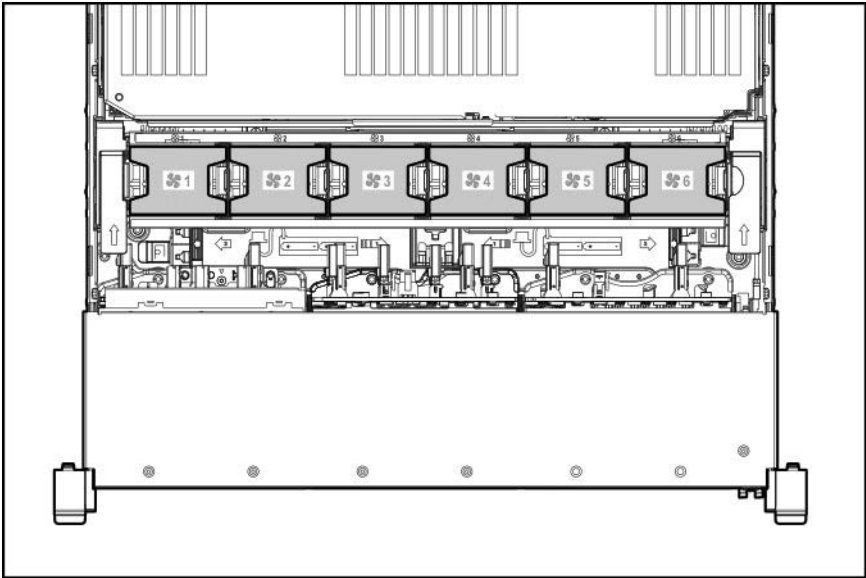


# uFF drive components and LEDs



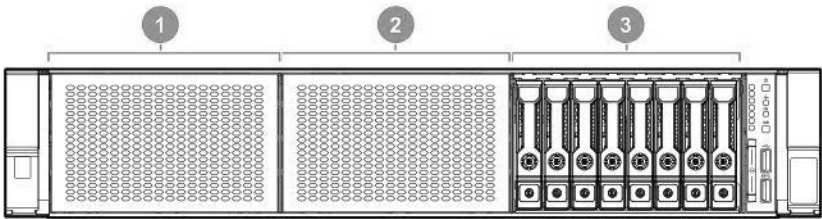
Item	Description	Status
1	Locate	<ul style="list-style-type: none"><li>Off—Normal</li><li>Solid blue—The drive is being identified by a host application</li><li>Flashing blue—The drive firmware is being updated or requires an update</li></ul>
2	uFF drive ejection latch	Removes the uFF drive when released
3	Do not remove LED	<ul style="list-style-type: none"><li>Off—OK to remove the drive. Removing the drive does not cause a logical drive to fail.</li><li>Solid white—Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.</li></ul>
4	Drive status LED	<ul style="list-style-type: none"><li>Off—The drive is not configured by a RAID controller</li><li>Solid green—The drive is a member of one or more logical drives</li><li>Flashing green (4 Hz)—The drive is operating normally and has activity</li><li>Flashing green (1 Hz)—The drive is rebuilding or performing a RAID migration, stripe size migration, capacity expansion, logical drive extension, or is erasing</li><li>Flashing amber/green (1 Hz)—The drive is a member of one or more logical drives that predicts the drive will fail</li><li>Solid amber—The drive has failed</li><li>Flashing amber (1 Hz)—The drive is not configured and predicts the drive will fail</li></ul>
5	Adapter ejection release latch and handle	Removes the SFF flash adapter when released

# Fan bay numbering

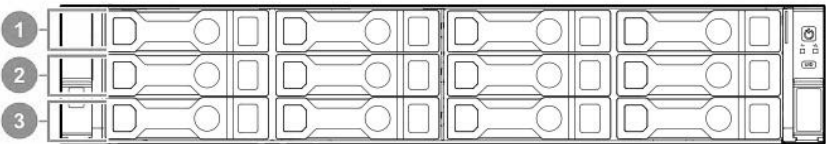


# Drive box identification

Front boxes

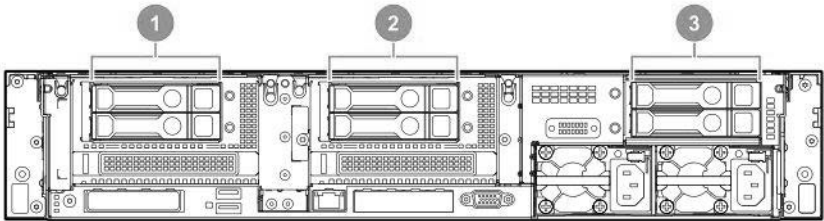


Item	Description
1	Box 1
2	Box 2
3	Box 3

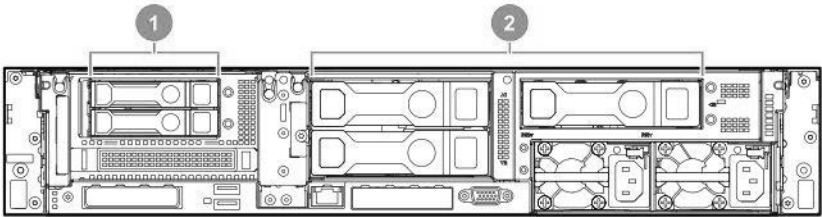


Item	Description
1	Box 1
2	Box 2
3	Box 3

Rear boxes

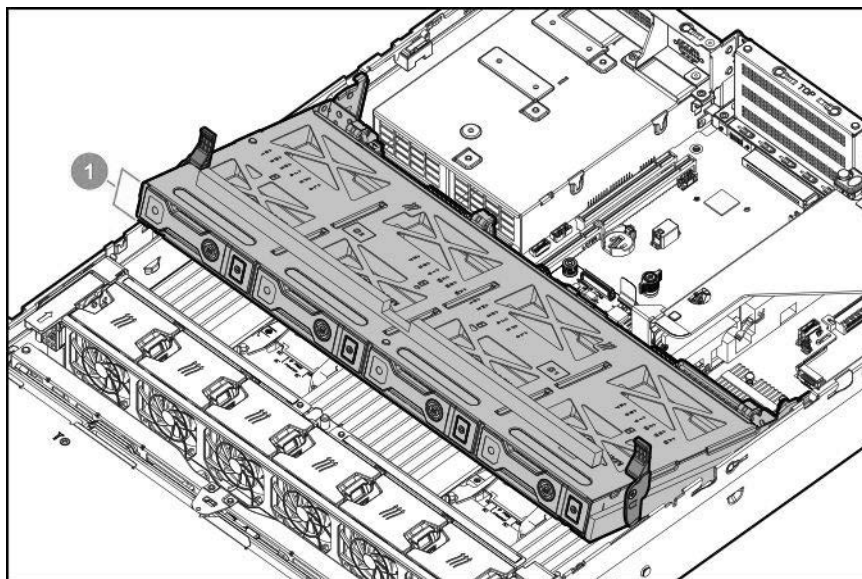


Item	Description
1	Box 4
2	Box 5
3	Box 6



Item	Description
1	Box 4
2	Box 6

## Midplane box (LFF only)



Item	Description
------	-------------

1	Box 7
---	-------

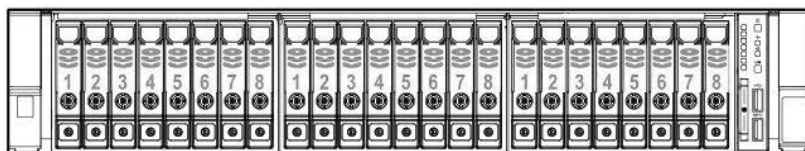
## Drive bay numbering

Drive bay numbering depends on how the drive backplanes are connected:

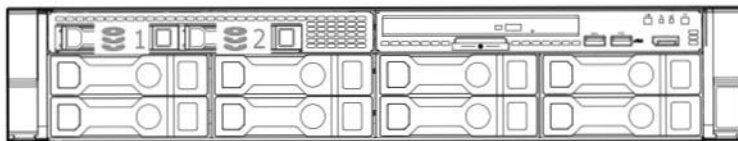
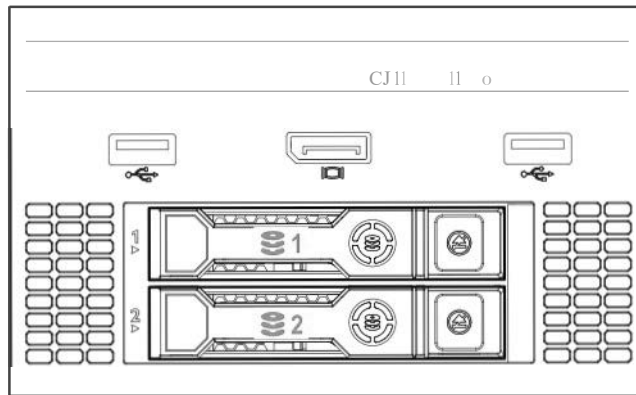
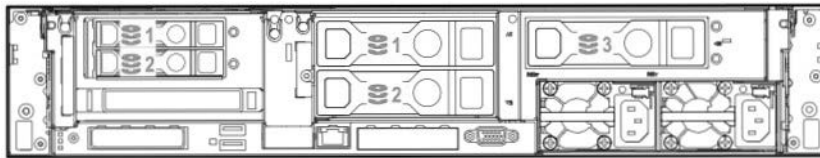
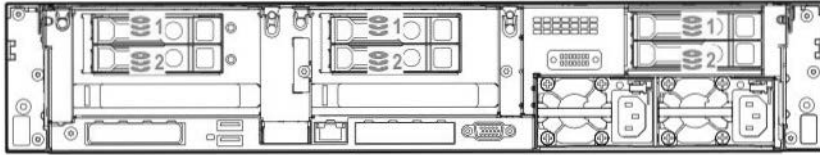
- To a controller
  - Embedded controllers use the onboard SATA ports.
  - Type-a controllers install to the type-a smart array connector.
  - Type-p controllers install to a PCIe riser.
- To a SAS expander
  - Installs in the primary or secondary PCIe riser

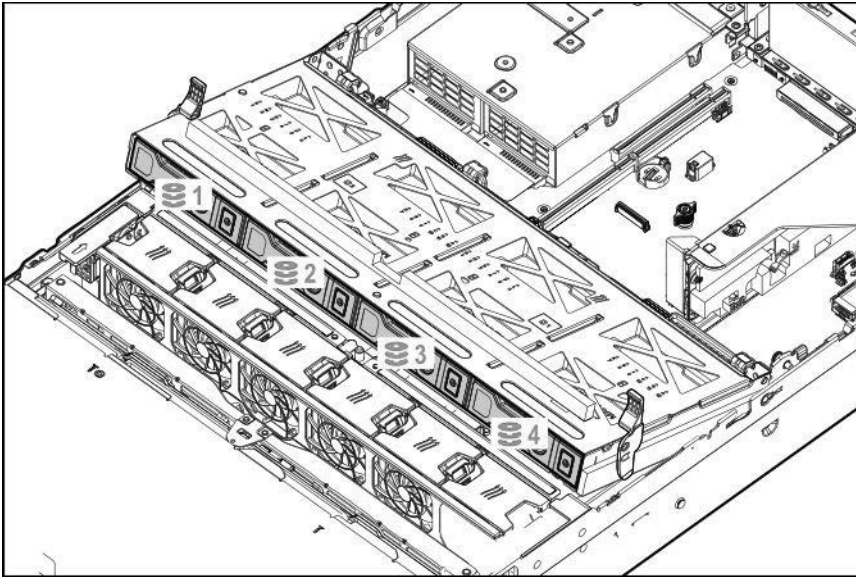
### Drive bay numbering: Smart array controller

When the drive backplane is connected directly to a storage controller, then each drive box starts at 1. The following images are examples of common configurations.



$O=100$   $D_{,,}=200$   $O_{\S 3} O D O_{\S 4} O O$   $R$   
 $D=100$   $D=200$   $D_{\S 3} O I D D_{\S 4} O O$   $\textcircled{R}$   
 $D=100$   $O=200$   $O_{\S 3} O I D O_{\S 4} O O$



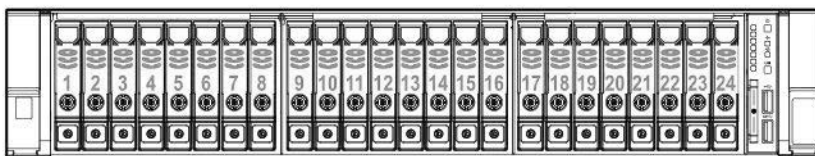


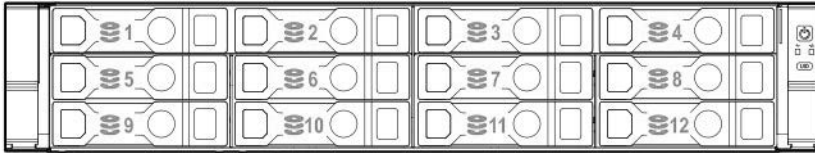
## Drive bay numbering: SAS expander

Drive numbering through a SAS Expander is continuous.

- SAS expander port 1 always connects to port 1 of the controller.
- SAS expander port 2 always connects to port 2 of the controller.
- SAS expander port 3 = drive numbers 1-4.
- SAS expander port 4 = drive numbers 5-8.
- SAS expander port 5 = drive numbers 9-12.
- SAS expander port 6 = drive numbers 13-16.
- SAS expander port 7 = drive numbers 17-20.
- SAS expander port 8 = drive numbers 21-24.
- SAS expander port 9 = drive numbers 25-

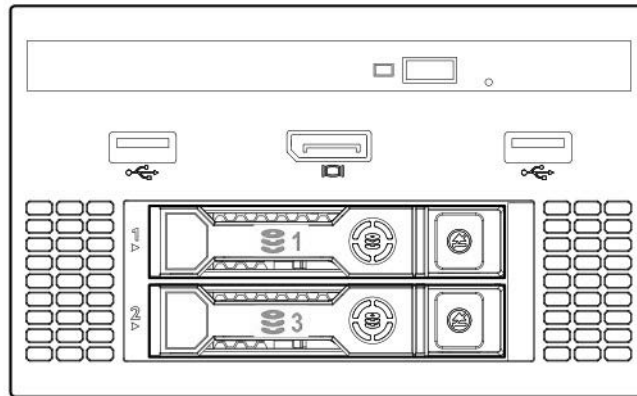
28. Common configuration examples:





When any stacked 2SFF drive configuration is connected to the SAS expander, the drive numbering skips the second number to allow **uFF drive bay numbering**.

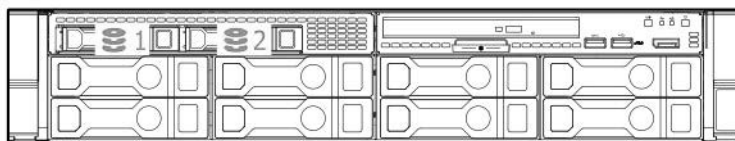
- Front 2SFF to SAS expander port 3:



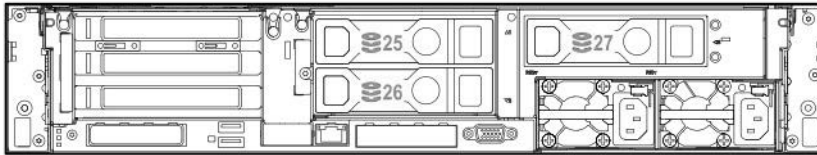
- Rear 2SFF to SAS expander port 9:



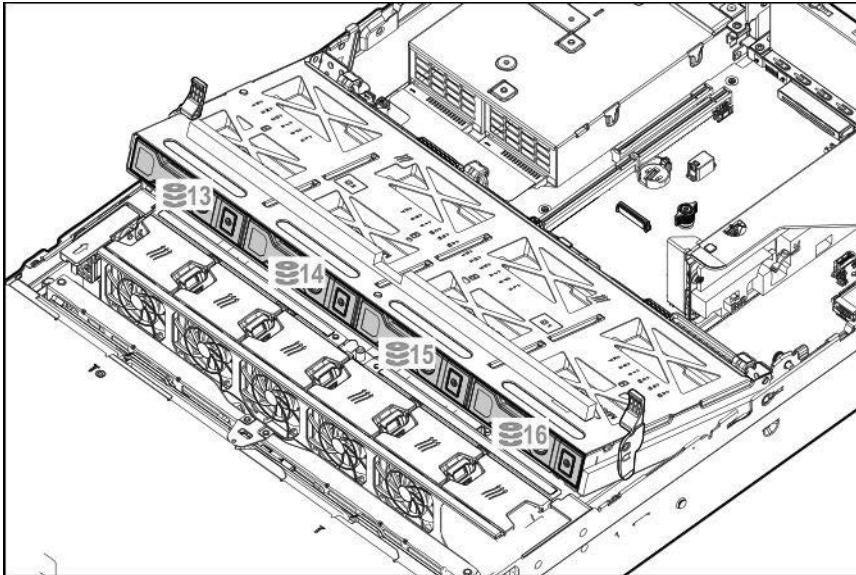
- Front 2SFF side-by-side (unstacked) to SAS expander port 3:



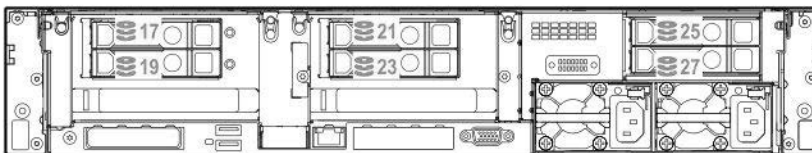
- Rear 3LFF to SAS expander port 9:



- Mid 4LFF to SAS expander port 6:

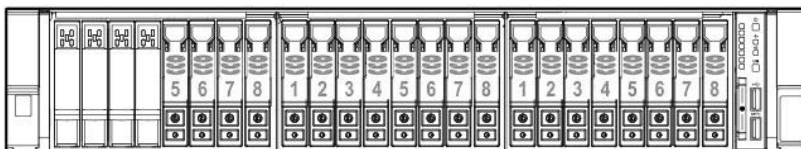


- Front 12LFF + Midplane 4LFF + All rear 2SFF:



## Drive bay numbering: NVMe drives

If the server is populated with NVMe drives and NVMe risers:

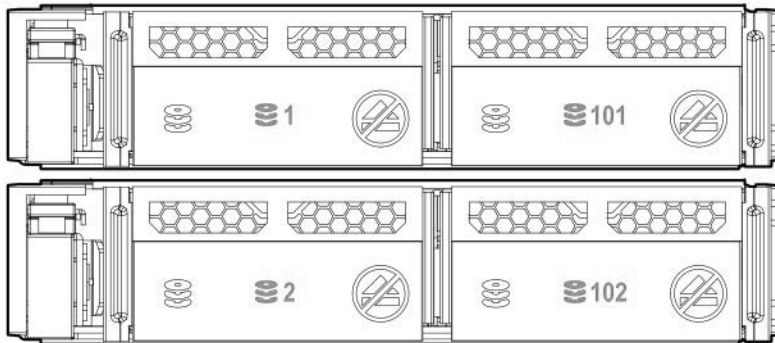




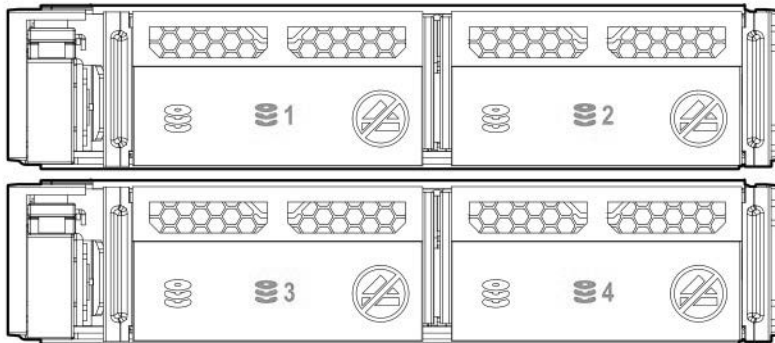
## uFF drive bay numbering

There are two uFF drives in each drive carrier. If the drives are connected to a controller:

- The left bay = The default bay number of the server
- The right bay = The default bay number of the server + 100



If the drives are connected to a SAS expander:

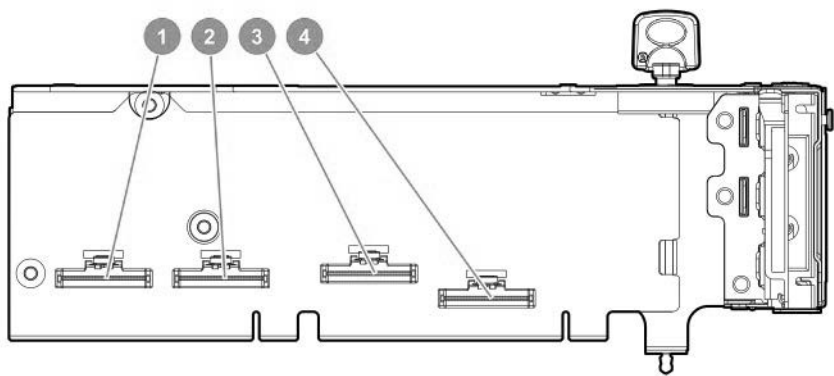


For example:

- If the drives are connected to port 3 of the SAS expander, then the uFF drives are 1-4.
- If the drives are connected to port 9 of the SAS expander, then the uFF drives are 25-28.

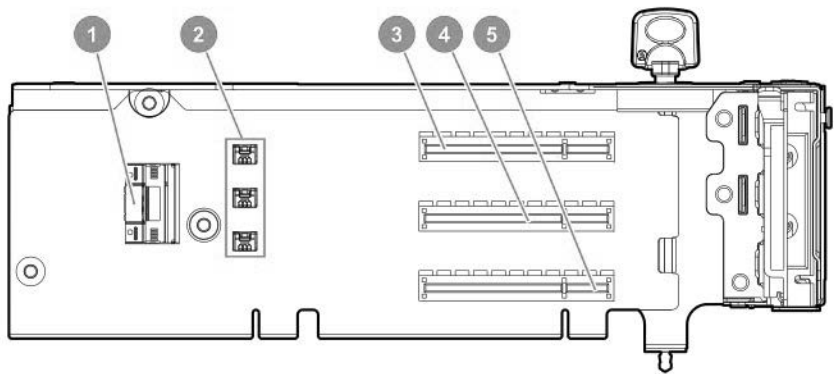
# Riser components

## 4-port NVMe Slimline riser



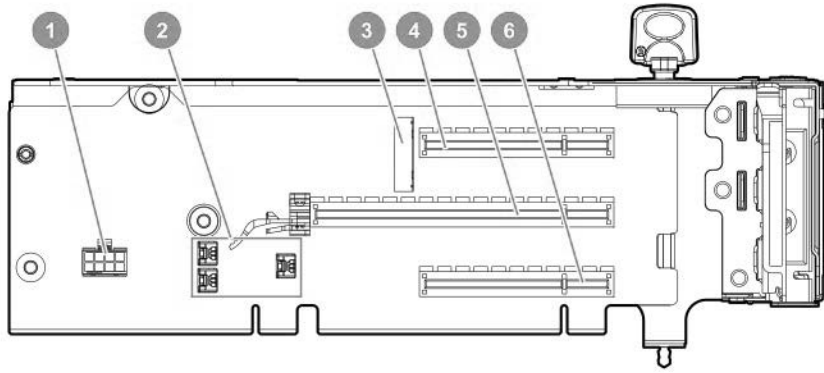
Item	Description
1–4	x8 Slimline NVMe connectors

## Three-slot with NVMe Slimline riser



Item	Description
1	x8 Slimline NVMe connector
2	Controller backup power connectors (3)
3–5	x8 PCIe slots

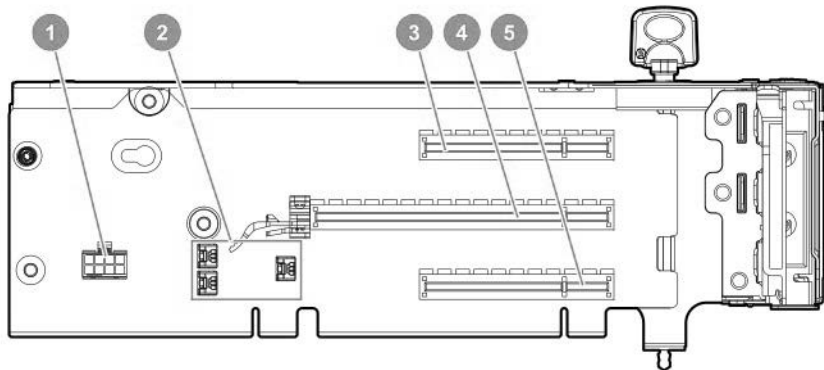
### Three-slot with M.2 riser



Item	Description
1	GPU power cable connector
2	Controller backup power connectors (3)
3	M.2 SSD drive connectors <sup>1</sup>
4	x8 PCIe slot
5	x16 PCIe slot
6	x8 PCIe slot

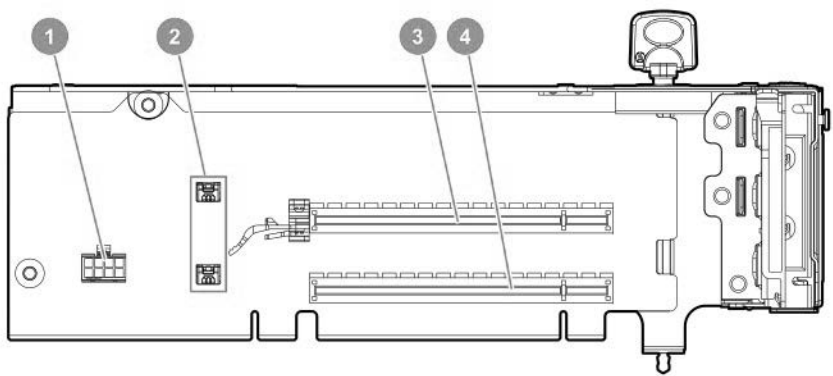
<sup>1</sup> The riser supports installation of a second M.2 SSD drive on the reverse side.

### Three-slot GPU riser



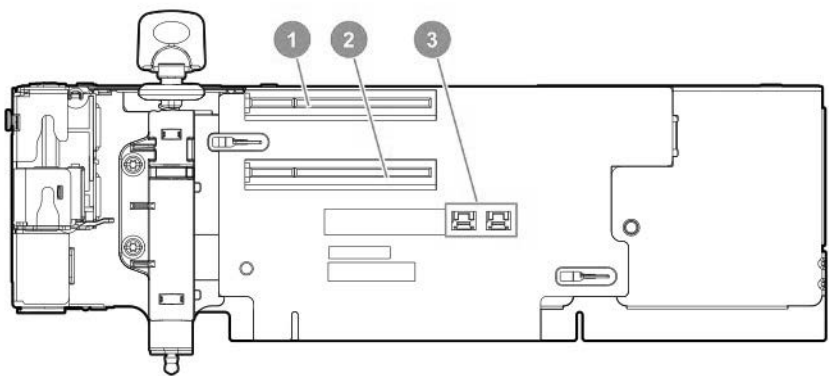
Item	Description
1	GPU power cable connector
2	Controller backup power connectors (3)
3	x8 PCIe slot
4	x16 PCIe slot
5	x8 PCIe slot

Two-slot GPU riser



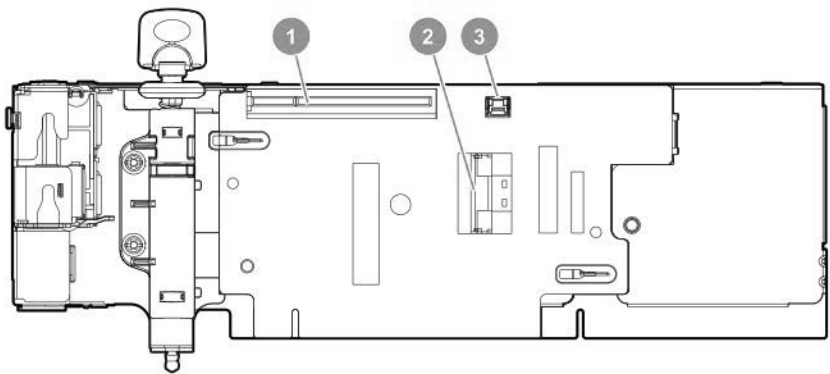
Item	Description
1	GPU power cable connector
2	Controller backup power connectors (2)
3	x16 PCIe slot
4	x16 PCIe slot

Two-slot x8 riser (tertiary)



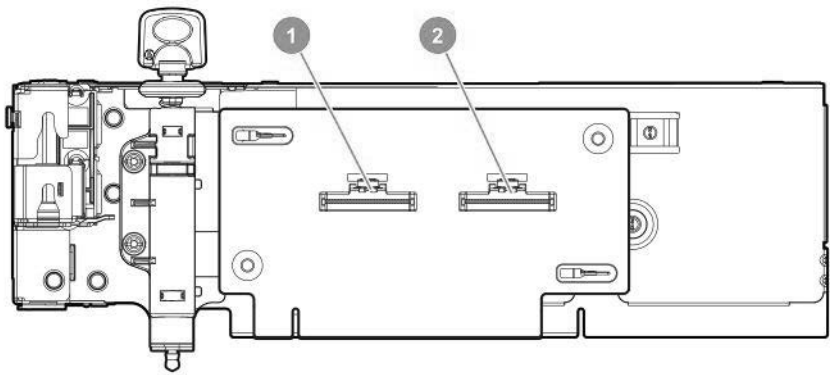
Item	Description
1	x8 PCIe slot
2	x8 PCIe slot
3	Controller backup power connectors (2)

**x8 riser (tertiary)**



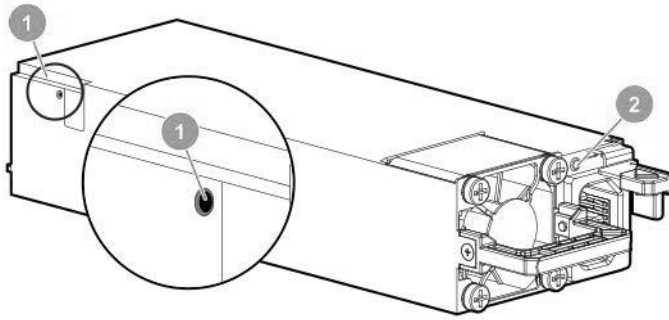
Item	Description
1	x8 PCIe slot
2	x8 Slimline NVMe connector
3	Controller backup power connector

**Dual Slimline riser (tertiary)**



Item	Description
1	x8 Slimline NVMe connector
2	x8 Slimline NVMe connector

# Flex Slot Power Supply with Integrated Battery Backup Unit components and LED



1. Battery check button

2. Power LED

For more information about the Flex Slot Power Supply with Integrated Battery Backup Unit, see the document that ships with the component.

The label on the component indicates that the flex slot power supply has an integrated battery back up module.



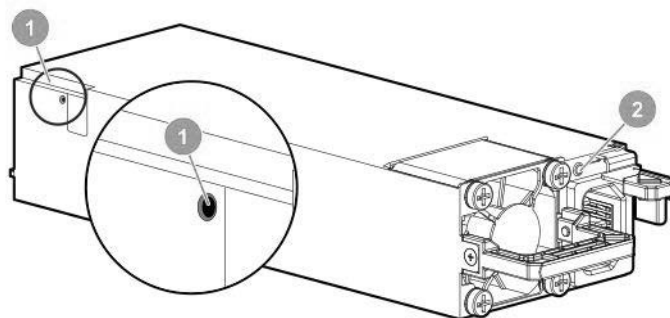
Figure 1: Flex Slot Power Supply with Integrated Battery Backup Unit label

## Checking the battery backup charge level

### Procedure

1. Using a ball tip pen, press and release the battery check button.

After releasing the button, you might have to wait up to seven seconds before the LED starts flashing.



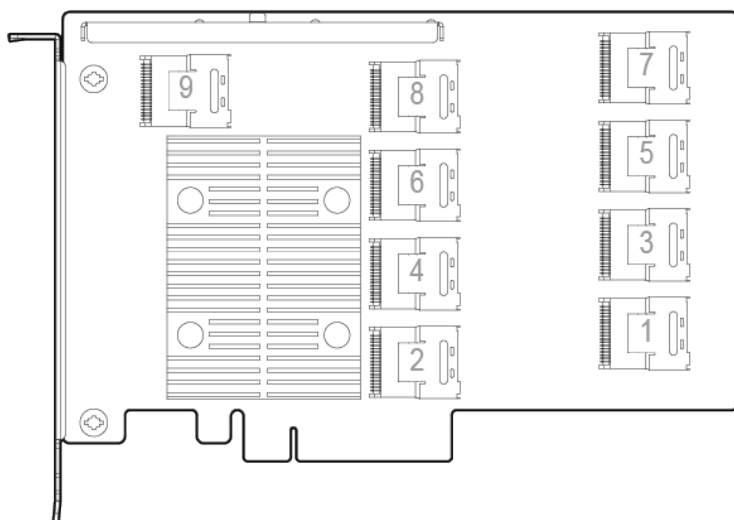
2. Note the number of LED flashes and reference the following table.

Flashes	Battery State RSOC <sup>1</sup>
0	Battery bad/failed
1	RSOC ≤ 29%
2	30% ≤ RSOC ≤ 62%
3	63% ≤ RSOC ≤ 94%
4	95% ≤ RSOC

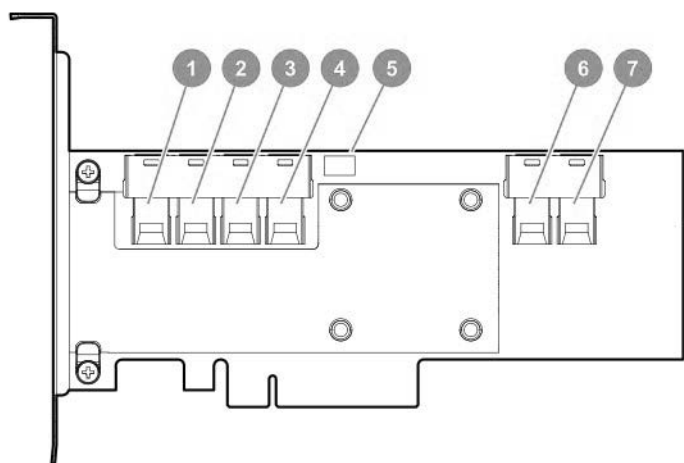
<sup>1</sup> Relative State of Charge

The battery will fully charge within one hour of being installed into the server.

## 12G SAS Expander Card port numbering



# Smart array P824i-p MR Controller

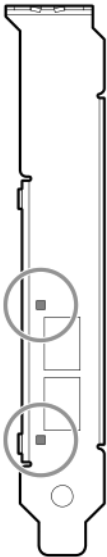


## Components

Item	Description
1	Internal SAS port 1i
2	Internal SAS port 2i
3	Internal SAS port 3i
4	Internal SAS port 4i
5	Controller backup power cable connector
6	Internal SAS port 5i
7	Internal SAS port 6i



# InfiniBand HDR/Ethernet 940QSFP 56x16 adapter LEDs

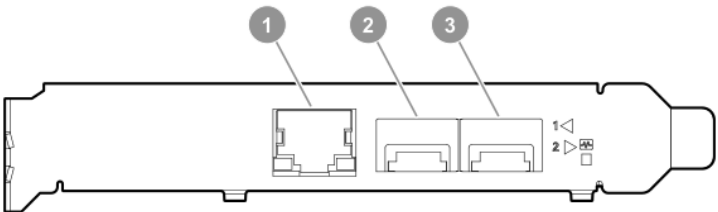


Link LED status <sup>1</sup>	Description
Off	A link has not been established.
Solid amber	Active physical link exists
Blinking amber	4 Hz blinking amber indicates a problem with the physical link.
Solid green	A valid logical (data activity) link exists with no active traffic.
Blinking green	A valid logical link exists with active traffic.

<sup>1</sup> 2-port adapter LEDs are shown. The 1-port adapters have only a single LED.

## DSC-25 2-port SFP28 card ports and LEDs

Ports

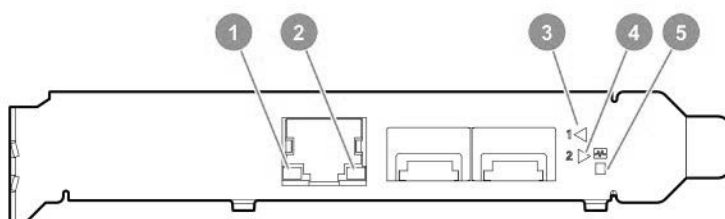


**Table 1: Ports**

Item	Port	Description
1	Management port	1GbE RJ45
2	Network interface port	10/25G SFP+ based
3	Network interface port	10/25G SFP+ based

**LEDs**

The DSP DSC-25 2p SFP28 Card is a dual-port, single-slot, half-height, half-length (HHHL) SFP28 network adapter. It has LEDs for Link (L) and Activity (A) for each port. A half-height bracket is shown in the following illustration with SFP28 ports and LEDs.

**Table 2: LED indicators**

Item	LED	Status	Description
1	Management Port Activity LED	Off	No activity
		Flashing	Passing traffic; flashing frequency indicates traffic intensity
2	Management Port Link LED	Off	A link has not been established
		Solid green	Valid Ethernet link
3	SFP Port 1 Link/Activity LED	Off	A link has not been established
		Solid green	Valid Ethernet link
		Flashing green	Passing traffic; flashing frequency indicates traffic intensity
		Solid amber	Link fault
4	SFP Port 2 Link/Activity LED	Off	A link has not been established
		Solid green	Valid Ethernet link

*Table Continued*

LED		Status	Description
		Flashing green	Passing traffic; flashing frequency indicates traffic intensity
		Solid amber	Link fault
5	System status LED	Off	System is not powered
		Solid amber	Power is up, software has not booted yet
		Solid green	System is up and fully operational

# Operations

## Power up the server

To power up the server, use one of the following methods:

- Press the Power On/Standby button.
- Use the virtual power button through iLO.

## Power down the server

Before powering down the server for any upgrade or maintenance procedures, perform a backup of critical server data and programs.

---

 **IMPORTANT:** When the server is in standby mode, auxiliary power is still being provided to the system.

---

To power down the server, use one of the following methods:

- Press and release the Power On/Standby button.  
This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.  
This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.
- Use a virtual power button selection through iLO.  
This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

Before proceeding, verify that the server is in standby mode by observing that the system power LED is amber.

## Extending the server from the rack



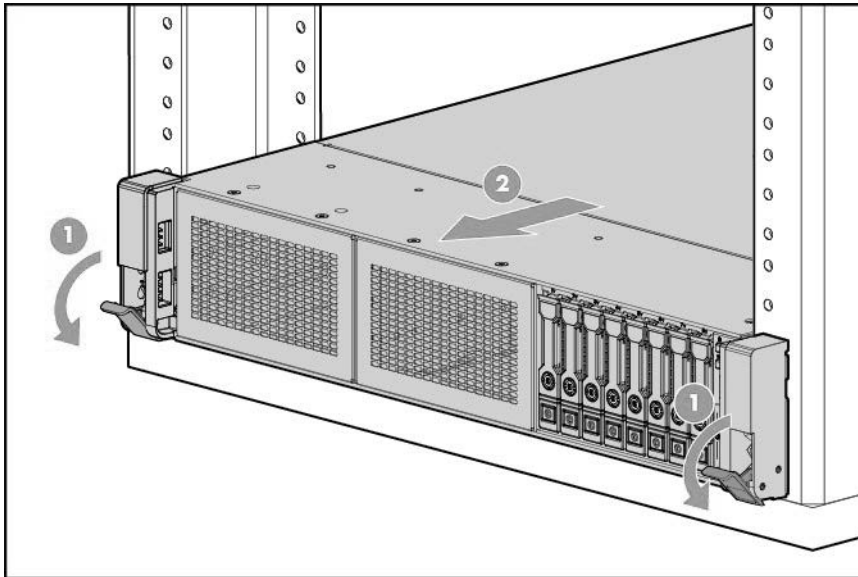
---

**WARNING:** To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending anything from the rack.

---

### Procedure

Pull down the quick release levers on each side of the server, and then extend the server from the rack.



## Removing the server from the rack

To remove the server from a rack:

### Procedure

1. **Power down the server.**
2. **Extend the server from the rack.**
3. Disconnect the cabling and remove the server from the rack.  
For more information, see the documentation that ships with the rack mounting option.
4. Place the server on a sturdy, level surface.

## Secure cables using the cable management arm

For rack rail installation instructions, see the documentation that ships with the rack rails.

---

**⚠ WARNING:** To reduce the risk of electric shock, fire, or damage to the equipment:

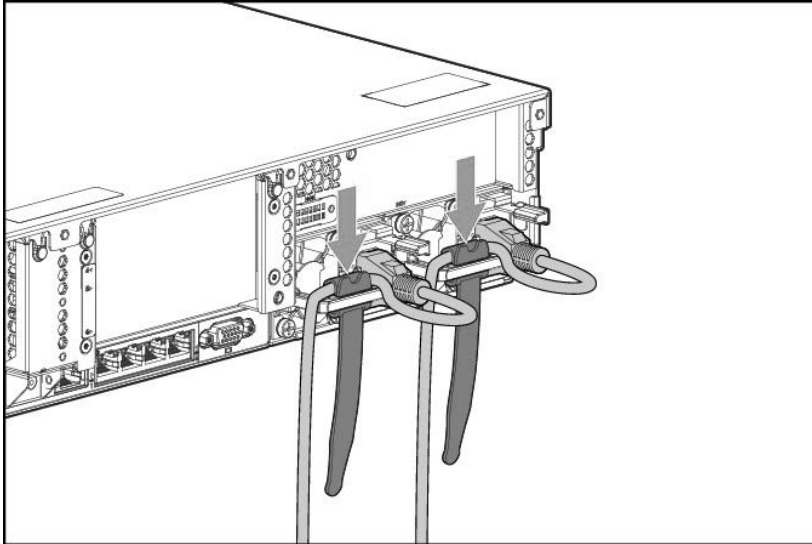
- Do not insert wrong connectors into ports.
  - Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
  - Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
  - Unplug the power cord from the power supply to disconnect power to the equipment.
  - Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.
-

## Procedure

1. After the server is racked, connect any peripheral devices to the server.

To identify components, see [Rear panel components](#).

2. At the rear of the server, plug in the power cord to the power supply.
3. Install the power cord anchors.

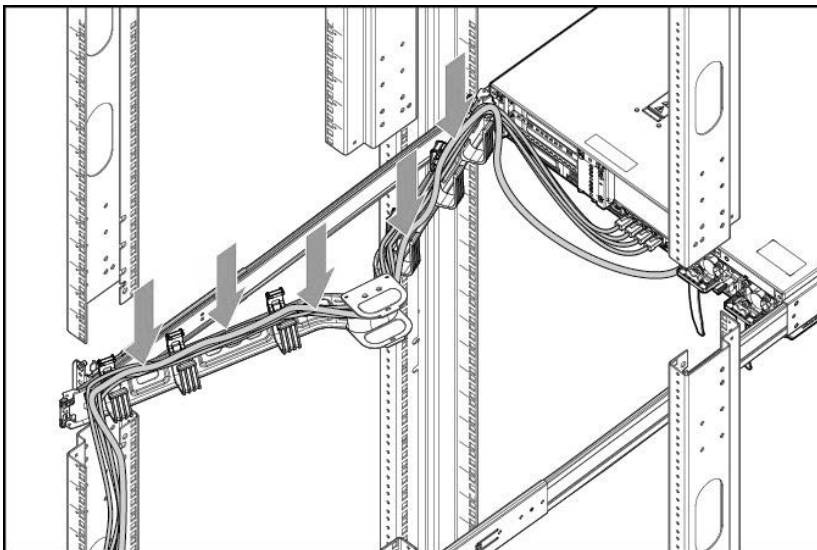


4. Secure the cables to the cable management arm.

---

❗ **IMPORTANT:** Leave enough slack in each of the cables to prevent damage to the cables when the server is extended from the rack.

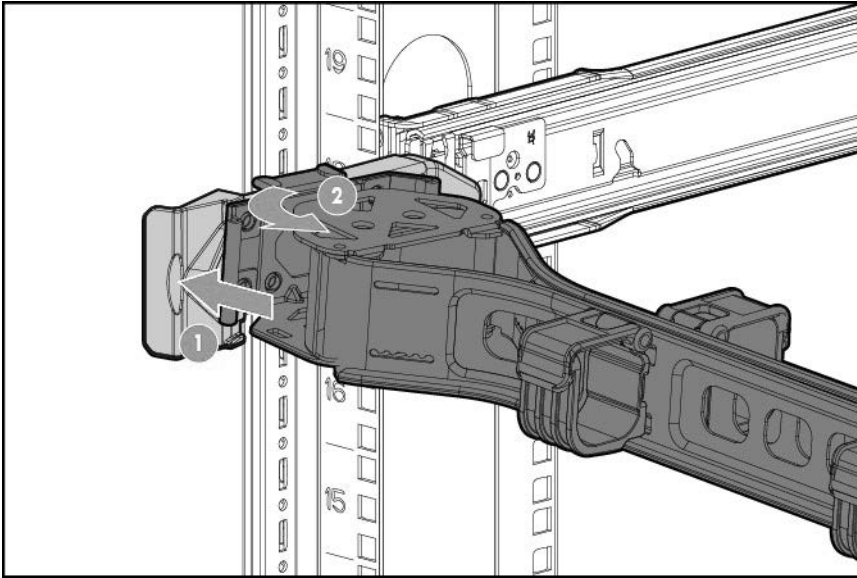
---



5. Connect the power cord to the AC power source.

## Release the cable management arm

Release the cable management arm and then swing the arm away from the rack.



## Remove the access panel

- 
- ⚠ WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives, power supplies, and internal system components to cool before touching them.
- 
- ⚠ CAUTION:** Do not operate the chassis for long periods with the access panel open or removed. Operating the chassis in this manner results in improper airflow and improper cooling that can lead to thermal damage.
- 

### Procedure

1. **Power down the server.**
2. **Extend the server from the rack.**
3. Open or unlock the locking latch, slide the access panel to the rear of the chassis, and remove the access panel.

## Install the access panel

### Procedure

1. Place the access panel on top of the server with the latch open.  
Allow the panel to extend past the rear of the server approximately 1.25 cm (0.5 in).
2. Push down on the latch.  
The access panel slides to a closed position.
3. Tighten the security screw on the latch, if needed.

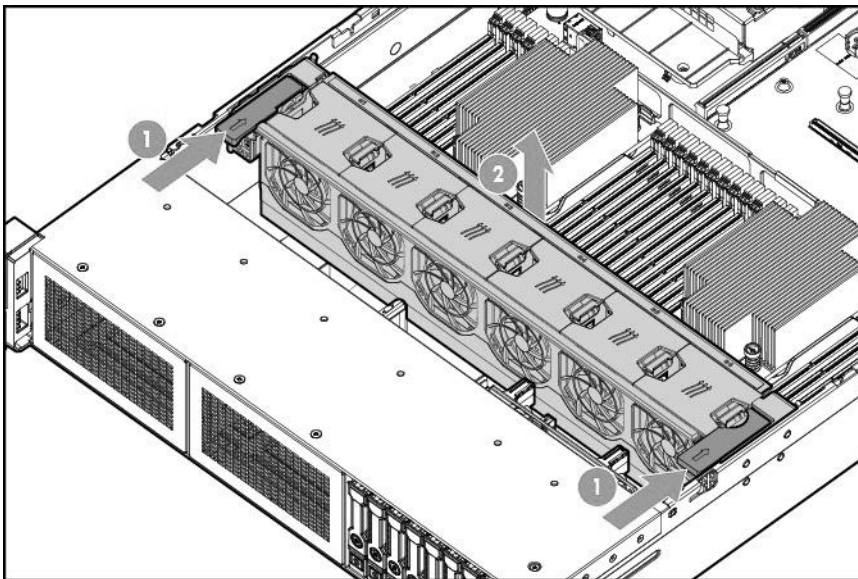
## Removing the fan cage

**⚠ CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

**❗ IMPORTANT:** For optimum cooling, install fans in all primary fan locations.

### Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. Remove the fan cage.



## Installing the fan cage

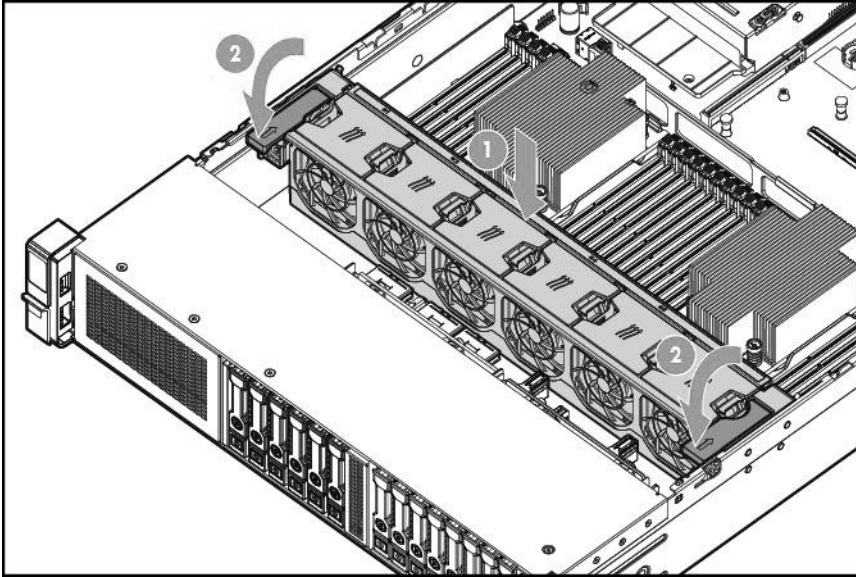
**⚠ CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.



---

**!** **IMPORTANT:** For optimum cooling, install fans in all primary fan locations.

---



## Removing the air baffle or midplane drive cage

---

**⚠ CAUTION:** Do not detach the cable that connects the battery pack to the cache module. Detaching the cable causes any unsaved data in the cache module to be lost.

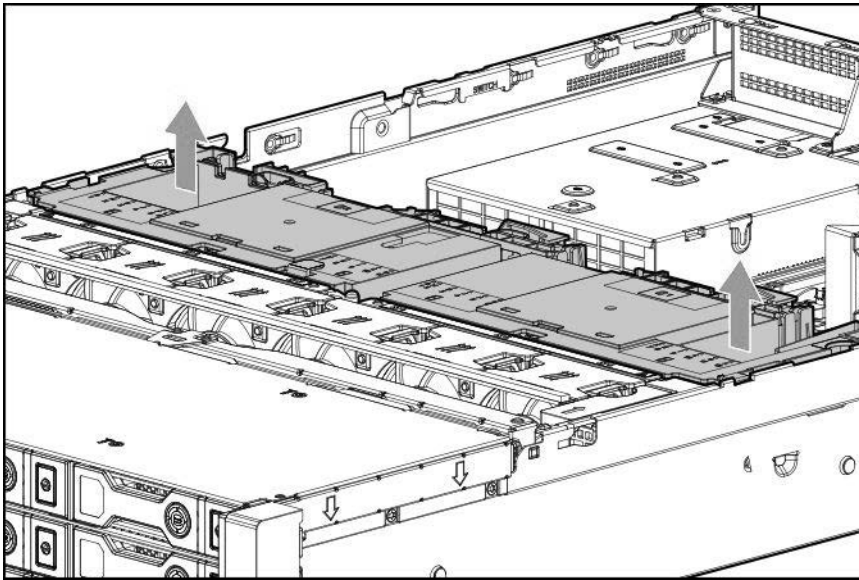
---

**⚠ CAUTION:** For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

---

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Do one of the following:
  - Remove the air baffle.

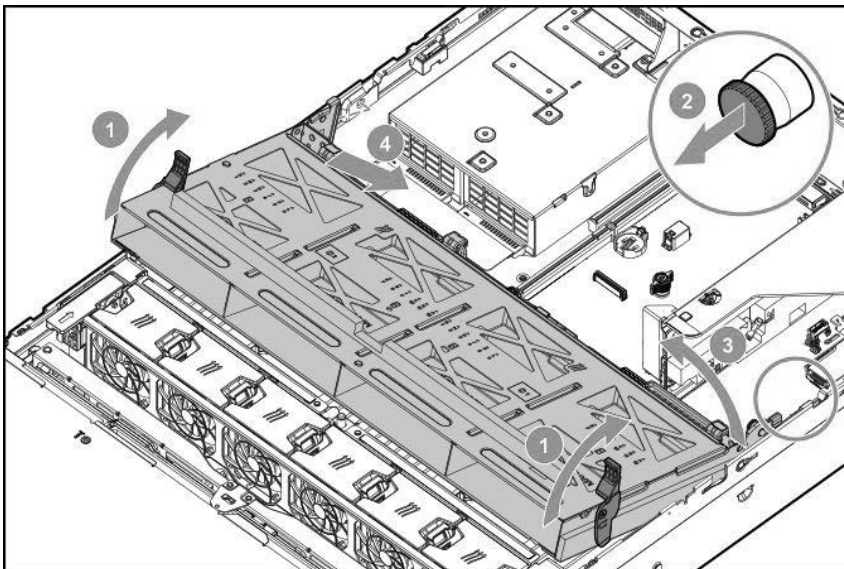


- Remove the 4LFF midplane drive cage:
  - a. Disconnect all cables.
  - b. Remove all drives.  
Be sure to note the location of each drive.
  - c. Remove the drive cage.

---

**⚠ CAUTION:** Do not drop the drive cage on the system board. Dropping the drive cage on the system board might damage the system or components. Remove all drives and use two hands when installing or removing the drive cage.

---



# Installing the air baffle

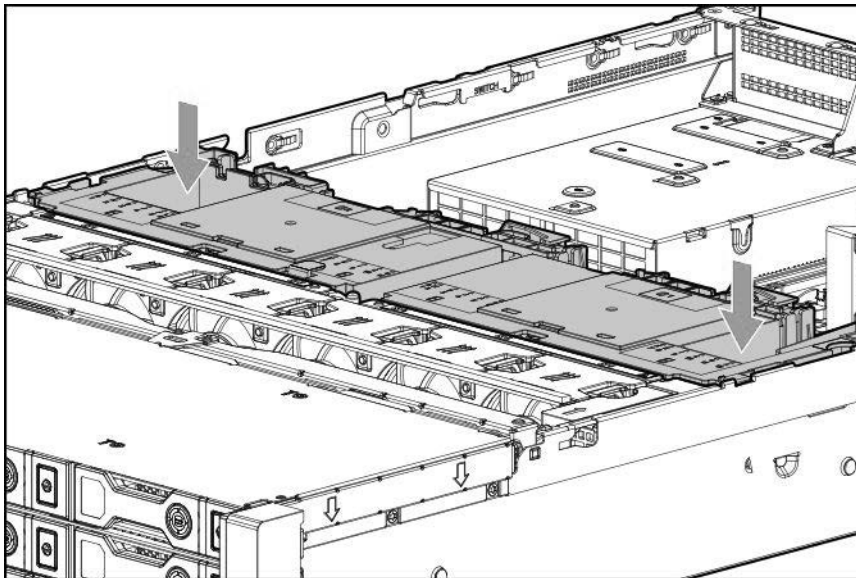
## Procedure

1. Observe the following alerts.

**⚠ CAUTION:** For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

**⚠ CAUTION:** Do not detach the cable that connects the battery pack to the cache module. Detaching the cable causes any unsaved data in the cache module to be lost.

2. Install the air baffle.



# Removing a riser cage

**⚠ CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

## Procedure

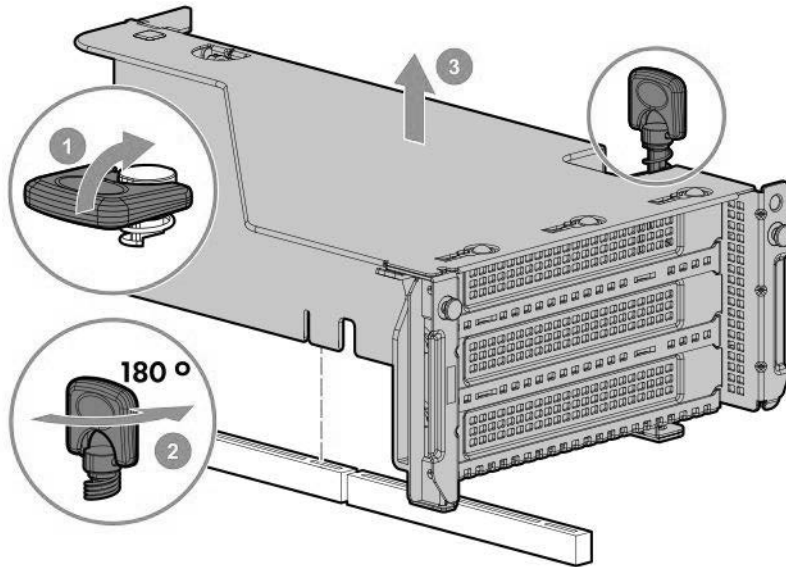
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:

- Extend the server from the rack.
- Remove the server from the rack.

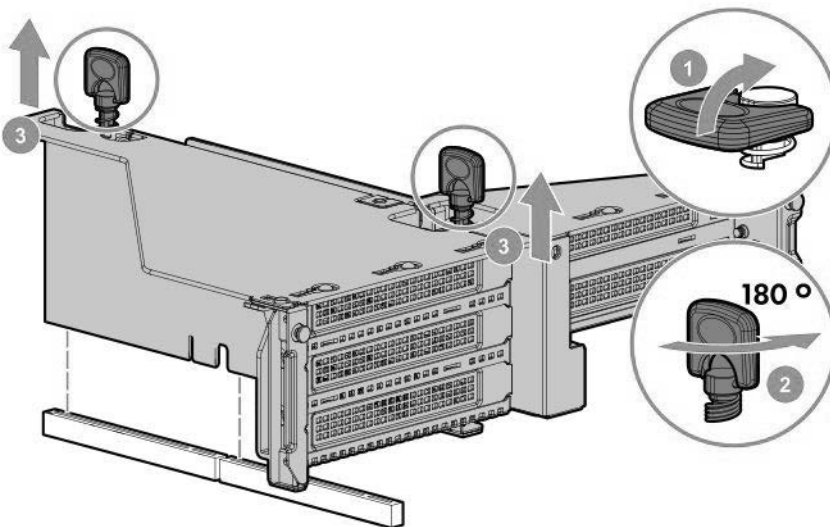
4. Remove the access panel.

5. Remove the riser cage:

- Primary and secondary riser cages



- Tertiary riser cage

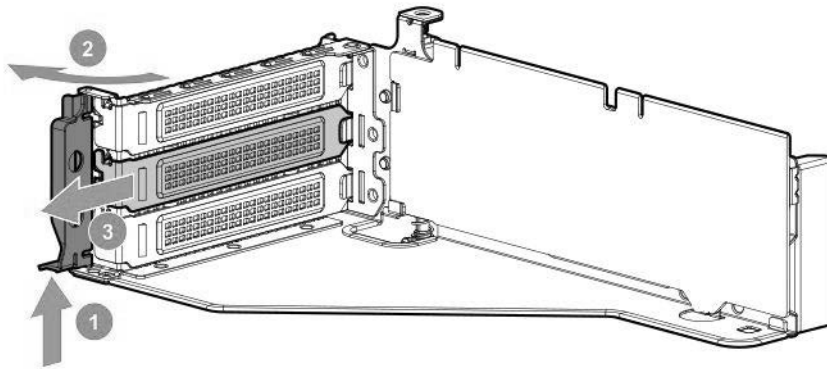


## Removing a riser slot blank

- ⚠ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

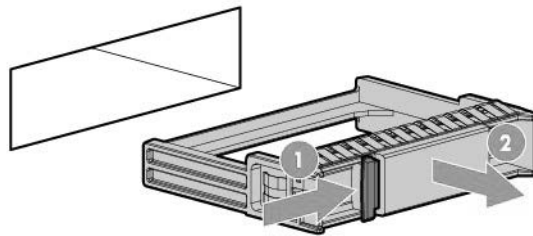
## Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the riser cage.**
6. Remove the blank.



## Removing the hard drive blank

Remove the component as indicated.



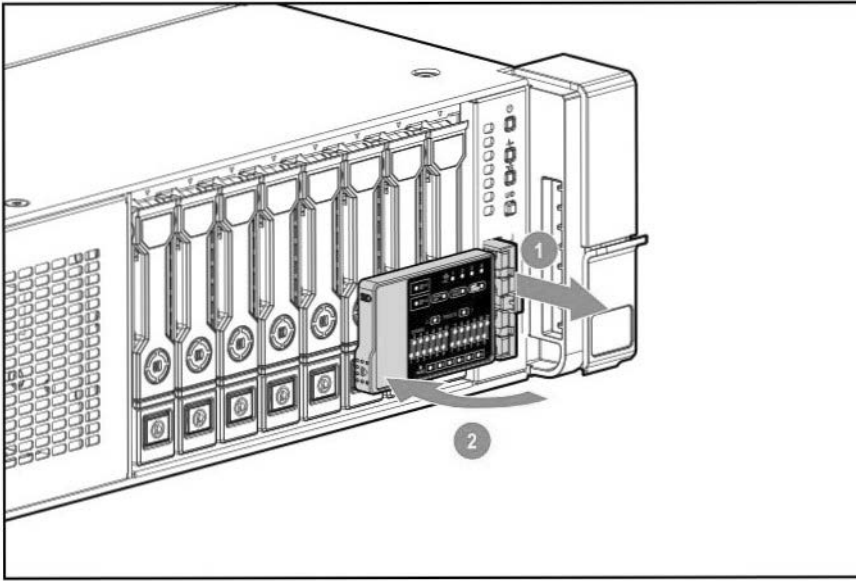
## Accessing the Systems Insight Display

The Systems Insight Display is supported only on SFF models.

### Procedure

1. Press and release the panel.

2. After the display fully ejects, rotate the display to view the LEDs.



# Setup

## Set up the server

### Prerequisites

Before setting up the server:

- Download the latest SPV:  
<https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>  
Support validation required
- Verify that your OS or virtualization software is supported:  
<https://support.hitachivantara.com/en/user/answers/interoperability.html>
- Read the operational requirements for the server:  
**Operational requirements**
- Obtain the storage driver if needed:
  - Download it from the support center website.
  - Extract it from the SPV.

### Procedure Unbox the server

#### 1. Unbox the server and verify the contents:

- A server
- A power cord
- Rack-mounting hardware
- Documentation

#### 2. (Optional) Install hardware options.

For installation instructions, see "Hardware options installation."

### Rack the server

#### 3. Install the server in a rack.

The racking procedures are included with the rack rails.

a. Connect devices, cables, and cords to the server.

b. **Secure cables using the cable management arm.**

#### 4. Decide how to manage the server:

- Locally: use a KVM switch or a connect a keyboard, monitor, and mouse.
- Remotely: connect to the iLO web interface and run a remote console:
  - a. Verify the following:

- iLO is licensed to use the remote console feature.
  - If iLO is not licensed, contact customer support.
  - The iLO management port is connected to a secure network.
- b.** Using a browser, navigate to the iLO web interface, and then log in.
- `https://<iLO hostname or IP address>`
- Note the following:
- The hostname is located on the serial pull tab.
  - If a DHCP server assigns the IP address, the IP address appears on the boot screen.
  - If a static IP address is assigned, use that IP address.
  - The default login credentials are located on the serial label pull tab.
- c.** In the side navigation, click the **Remote Console & Media** link, and then launch a remote console.

### Power on the server

- 5.** Press the Power On/Standby button.
- For remote management, use the iLO virtual power button.

### Update the firmware


- 6.** Using the SPV, update the following:

- System ROM
- Storage controller
- Network adapters
- Intelligent Provisioning

### Set up storage

- 7.** Do one of the following:
- To configure the server to boot from a SAN, review the relevant document at <https://knowledge.hitachivantara.com/Documents/Servers>.
  - If a smart array controller is installed:
    - For smart array SR controllers, use Smart Storage Administrator to create arrays:
      - a.** From the boot screen, press **F10** to run Intelligent Provisioning.
      - b.** From Intelligent Provisioning, run Smart Storage Administrator.
    - For smart array MR controllers, use the UEFI System Configuration to create arrays.
- For procedures on creating arrays with MR controllers, see the following guide:
- Smart array P824i-p MR User Guide*

---

 **IMPORTANT:** Smart array MR controllers are not supported by Intelligent Provisioning or Smart Storage Administrator.

---



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**NOTE:** Before installing an OS with a smart array MR controller, configure the drives. If the drives are not configured, the OS will not detect the drives during installation. For more information, see the Smart array MR user guide for your controller.

---

- If no controller is installed, do one of the following:
  - AHCI is enabled by default. You can deploy an OS or virtualization software.
  - Disable AHCI, enable software RAID, and then create an array:
    - a. From the boot screen, press **F9** to run UEFI System Utilities.
    - b. From the UEFI System Utilities screen, select **System Configurations > BIOS/Platform Configuration (RBSU) > Storage Options > SATA Controller Options > Embedded SATA configuration > Smart array SW RAID Support**
    - c. Enable SW RAID.
    - d. Save the configuration and reboot the server.
    - e. Create an array:
      - I. From the boot screen, press **F9** to run UEFI System Utilities.
      - II. From the UEFI System Utilities screen, select **System Configuration > Embedded Storage: Smart Storage S100i SR > Array Configuration > Create Array**

#### Deploy an OS or virtualization software

8. Do one of the following:

- Run Intelligent Provisioning to deploy an OS.

Press **F10** at the boot screen to run Intelligent Provisioning.



**IMPORTANT:** Smart array MR controllers are not supported by Intelligent Provisioning or Smart Storage Administrator.

---

- Manually deploy an OS.
  - a. Insert the installation media.

For remote management, click **Virtual Drives** in the iLO remote console to mount images, drivers, or files to a virtual folder. If a storage driver is required to install the OS, use the virtual folder to store the driver.
  - b. Press **F11** at the boot screen to select the boot device.
  - c. After the OS is installed, update the drivers.

9. Register the server (contact customer support).

## Operational requirements

### Space and airflow requirements

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

Hitachi Advanced Server products draw in cool air through the front door and expel warm air through the rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

---

**⚠ CAUTION:** To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

---

When vertical space in the rack is not filled by a server or rack component, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanking panels to maintain proper airflow.

---

**⚠ CAUTION:** Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

---

The 9000 and 10000 Series Racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64 percent open area for ventilation.

---

**⚠ CAUTION:** When using a Compaq branded 7000 series rack, install the high airflow rack door insert (PN 327281-B21 for 42U rack, PN 157847-B21 for 22U rack) to provide proper front-to-back airflow and cooling.

---

---

**⚠ CAUTION:** If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
  - Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).
- 

## Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the system in a well-ventilated, climate-controlled environment.

The maximum recommended ambient operating temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack is located must not exceed 35°C (95°F).

---

**⚠ CAUTION:** To reduce the risk of damage to the equipment when installing third-party options:


- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.
  - Do not exceed the manufacturer's TMRA.
- 

## Power requirements


Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic

Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

---

 **WARNING:** To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

---

 **CAUTION:** Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.


---


## Electrical grounding requirements

The server must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.


Because of the high ground-leakage currents associated with multiple servers connected to the same power source, Hitachi Vantara recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

## Connecting a DC power cable to a DC power source


- 
-  **WARNING:** To reduce the risk of electric shock or energy hazards:
- This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment.
  - Connect the equipment to a reliably grounded Secondary circuit source. A Secondary circuit has no direct connection to a Primary circuit and derives its power from a transformer, converter, or equivalent isolation device.
  - The branch circuit overcurrent protection must be rated 27 A.
- 

 **WARNING:** When installing a DC power supply, the ground wire must be connected before the positive or negative leads.


---

 **WARNING:** Remove power from the power supply before performing any installation steps or maintenance on the power supply.

---

 **CAUTION:** The server equipment connects the earthed conductor of the DC supply circuit to the earthing conductor at the equipment. For more information, see the documentation that ships with the power supply.

---

 **CAUTION:** If the DC connection exists between the earthed conductor of the DC supply circuit and the earthing conductor at the server equipment, the following conditions must be met:


- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.
- This equipment should be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system should be earthed elsewhere.
- The DC supply source is to be located within the same premises as the equipment.
- Switching or disconnecting devices should not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

---


To connect a DC power cable to a DC power source:

1. Cut the DC power cord ends no shorter than 150 cm (59.06 in).
2. If the power source requires ring tongues, use a crimping tool to install the ring tongues on the power cord wires.

---

 **IMPORTANT:** The ring terminals must be UL approved and accommodate 12 gauge wires.


---

 **IMPORTANT:** The minimum nominal thread diameter of a pillar or stud type terminal must be 3.5 mm (0.138 in); the diameter of a screw type terminal must be 4.0 mm (0.157 in).


- 
3. Stack each same-colored pair of wires and then attach them to the same power source. The power cord consists of three wires (black, red, and green).

For more information, see the documentation that ships with the power supply.


## Server warnings and cautions

- 
-  **WARNING:** This server is heavy. To reduce the risk of personal injury or damage to the equipment:
- Observe local occupational health and safety requirements and guidelines for manual material handling.
  - Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. Hitachi Vantara recommends that a minimum of two people are required for all rack server installations. If the server is installed higher than chest level, a third person may be required to help align the server.
  - Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.


---

 **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

---

 **WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC/DC power is removed.


---

 **WARNING:** To reduce the risk of fire or burns after removing the energy pack:


- Do not disassemble, crush, or puncture the energy pack.
- Do not short external contacts.
- Do not dispose of the energy pack in fire or water.

After power is disconnected, battery voltage might still be present for 1s to 160s.

---

 **CAUTION:** Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.


---

 **CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

---


## Rack warnings

---

 **WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:


- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

---


 **WARNING:** To reduce the risk of personal injury or equipment damage when unloading a rack:

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and might become unstable when being moved on its casters.
- Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.

---

 **WARNING:** To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.

---

 **WARNING:** When installing a server in a telco rack, be sure that the rack frame is adequately secured at the top and bottom to the building structure.

---

## Electrostatic discharge

Be aware of the precautions you must follow when setting up the system or handling components. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the system or component.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:
  - Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm  $\pm 10$  percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
  - Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
  - Use conductive field service tools.
  - Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

## Server box contents

The server shipping box contains the following contents:

- A server
- A power cord
- Rack-mounting hardware (optional)
- Documentation

## Installing hardware options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to "[Hardware options installation](#)."

## POST screen options

When the server is powered on, the POST screen is displayed. The following options are displayed:

- **System Utilities** (F9)

Use this option to configure the system BIOS.

- **Intelligent Provisioning** (F10)

Use this option to deploy an operating system or configure storage.

- **Boot order (F11)**

Use this option to make a one-time boot selection.

- **Network boot (F12)**

Use this option to boot the server from the network.

## Installing or deploying an operating system

Before installing an operating system, observe the following:

- Be sure to read the UEFI requirements for Advanced Server products on the <https://knowledge.hitachivantara.com/Documents/Servers>. If UEFI requirements are not met, you might experience boot failures or other errors when installing the operating system.
- Update firmware before using the server for the first time, unless software or components require an older version. For more information, see [Keeping the system current](#).
- For the latest information about supported operating systems, see <https://support.hitachivantara.com/en/user/answers/interoperability.html>.
- The server does not ship with OS media. All system software and firmware is preloaded on the server.

## Registering the server

Register the product at <https://support.hitachivantara.com/en/user/home.html>.

# Hardware options installation

## Introduction

Install any hardware options before initializing the server. If multiple options are being installed, read the installation instructions for all the hardware options to identify similar steps and streamline the installation process.



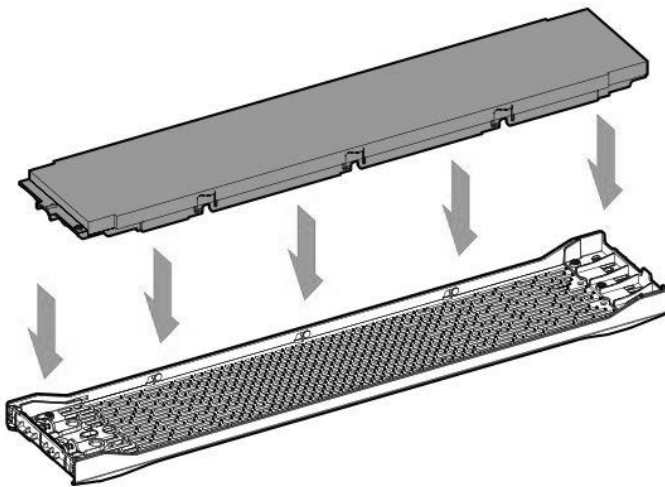
**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.



**CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

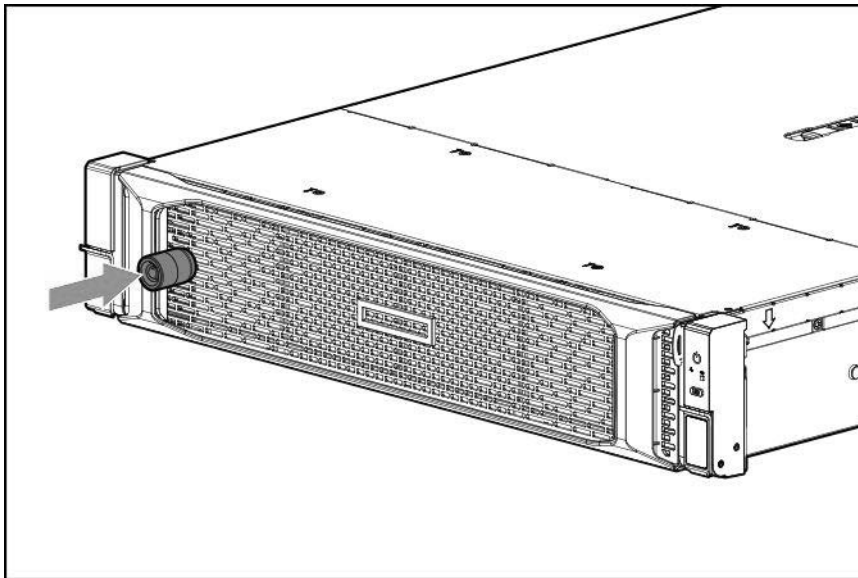
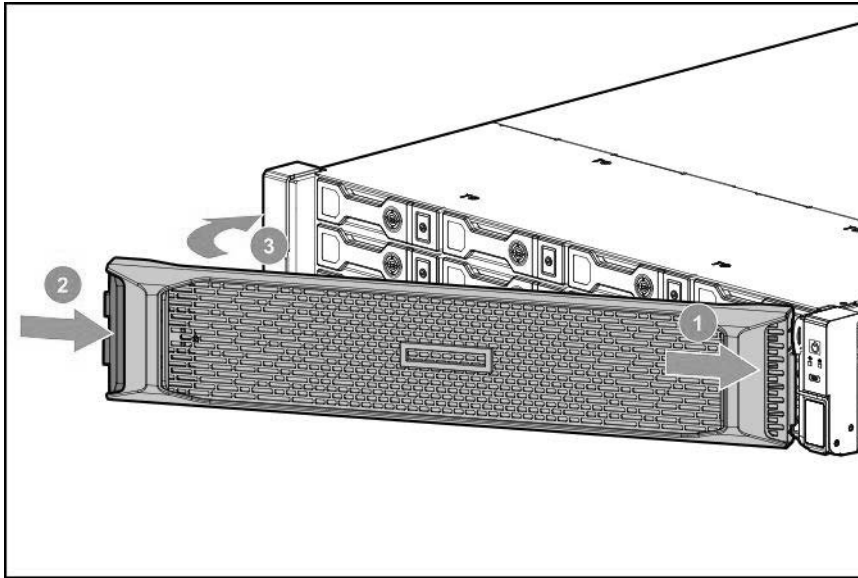
## Installing a fan filter into the security bezel

The fan filter installs into the security bezel. To add a fan filter, the server must have a security bezel.





## Installing the bezel and bezel lock



## Power supply options

### Installing a redundant hot-plug power supply

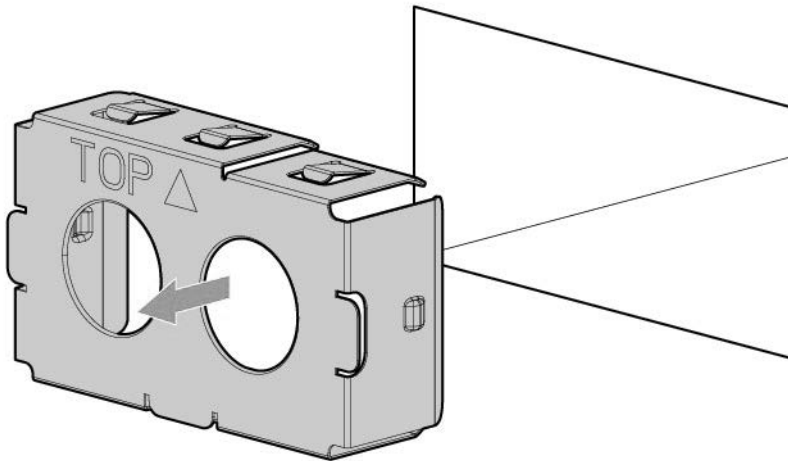
- 
- ⚠ CAUTION:** All power supplies installed in the server must have the same output power capacity. Verify that all power supplies have the same part number and label color. The system becomes unstable and might shut down if it detects different power supplies.
-

- 
- ⚠ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.
- 

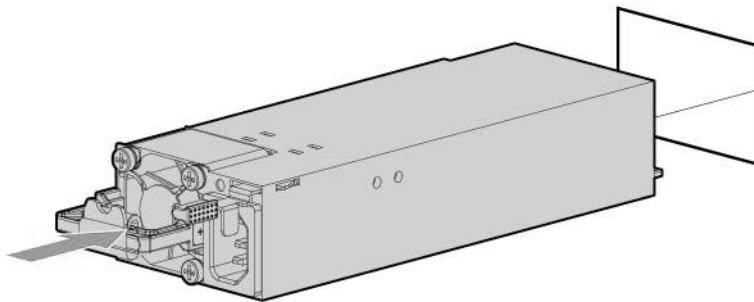
#### Procedure

1. **Release the cable management arm to access the rear panel.**
2. Remove the blank.

- 
- ⚠ WARNING:** To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.
- 



3. Insert the power supply into the power supply bay until it clicks into place.



4. Connect the power cord to the power supply.
5. Route the power cord.  
Use the cable management arm and best practices when routing cords and cables.
6. Connect the power cord to the power source.
7. Observe the power supply LED.

# Energy pack options

Hitachi Vantara offers two centralized backup power source options to back up write cache content on P-class Smart array controllers in case of an unplanned server power outage.

- **Smart Storage Battery**
- **Smart Storage Hybrid Capacitor**



**IMPORTANT:** The Smart Storage Hybrid Capacitor is only supported on HA800 and later servers that support the 96W Smart Storage Battery.

---

One energy pack option can support multiple devices. An energy pack option is required for P-class Smart array controllers. Once installed, the status of the energy pack displays in iLO. For more information, see the iLO User Guide on the Hitachi Vantara website (<https://knowledge.hitachivantara.com/Documents/Servers>).

## Smart Storage Battery

The Smart Storage Battery supports the following devices:

- Smart array SR controllers
- Smart array MR controllers
- NVDIMMs



**IMPORTANT:** To support NVDIMMs, the Smart Storage Battery must be installed.

---

A single 96W battery can support up to 24 devices.

After the battery is installed, it might take up to two hours to charge. Controller features requiring backup power are not re-enabled until the battery is capable of supporting the backup power.

This server supports the 96W Smart Storage Battery with the 145mm cable.

## Installing a Smart Storage Battery

### Prerequisites

Before you perform this procedure, make sure that you have the following items

available: The components included with the hardware option kit

---

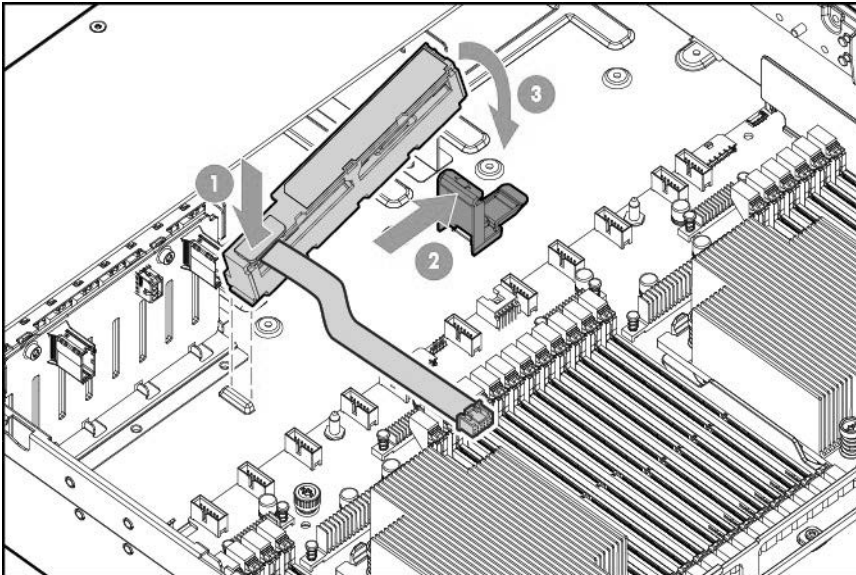
**NOTE:** System ROM and firmware messages might display "energy pack" in place of "Smart Storage Battery." Energy pack refers to both Smart Storage batteries and Smart Storage Hybrid capacitors.

---

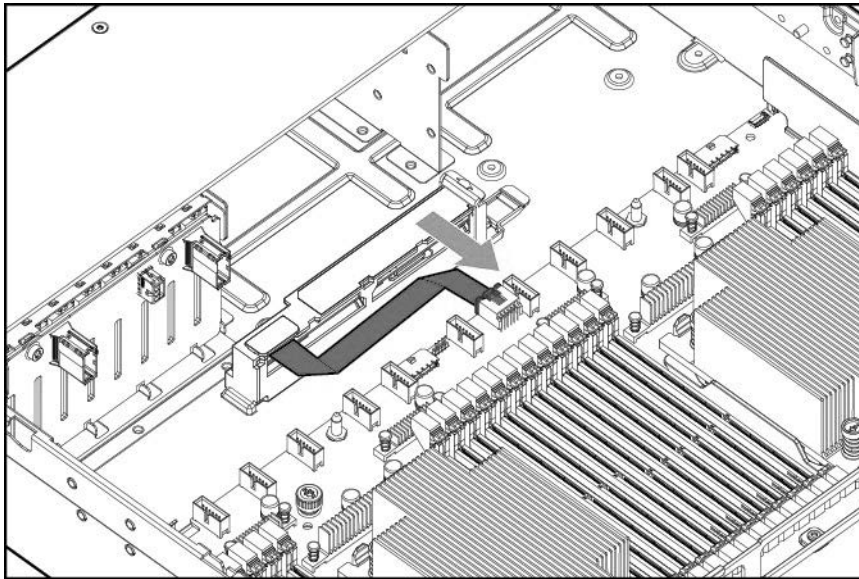
### Procedure

1. **Power down the server** .
2. Do one of the following:
  - Disconnect each power cord from the power source.

- Disconnect each power cord from the server.
3. Do one of the following:
    - Extend the server from the rack.
    - Remove the server from the rack.
  4. Remove the access panel.
  5. Do one of the following:
    - Remove the air baffle.
    - If installed on LFF models, remove the midplane drive cage.
  6. Install the Smart Storage battery.



7. Install the cable.



8. Install the fan cage.
9. **Install the air baffle.**
10. **Install the access panel.**
11. Slide the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.  
**Power up the server .**

The installation is complete.

## Smart Storage Hybrid Capacitor

The Smart Storage Hybrid Capacitor supports the following devices:

- Smart array SR controllers
- Smart array MR controllers

---

**!** **IMPORTANT:** NVDIMMs are only supported by the Smart Storage Battery.

---

The capacitor pack can support up to three devices.

This server supports the Smart Storage Hybrid Capacitor with the 145mm cable.

Before installing the Smart Storage Hybrid Capacitor, verify that the system BIOS meets the minimum firmware requirements to support the capacitor pack.

---

**!** **IMPORTANT:** If the system BIOS or controller firmware is older than the minimum recommended firmware versions, the capacitor pack will only support one device.

---

The capacitor pack is fully charged after the system boots.

## Minimum firmware versions

Product	Minimum firmware version
Hitachi Advanced Server HA820 system ROM	2.00
Smart array SR controllers	1.90
Smart array MR controllers	24.23.0-0041

## Installing an energy pack option for Smart Storage

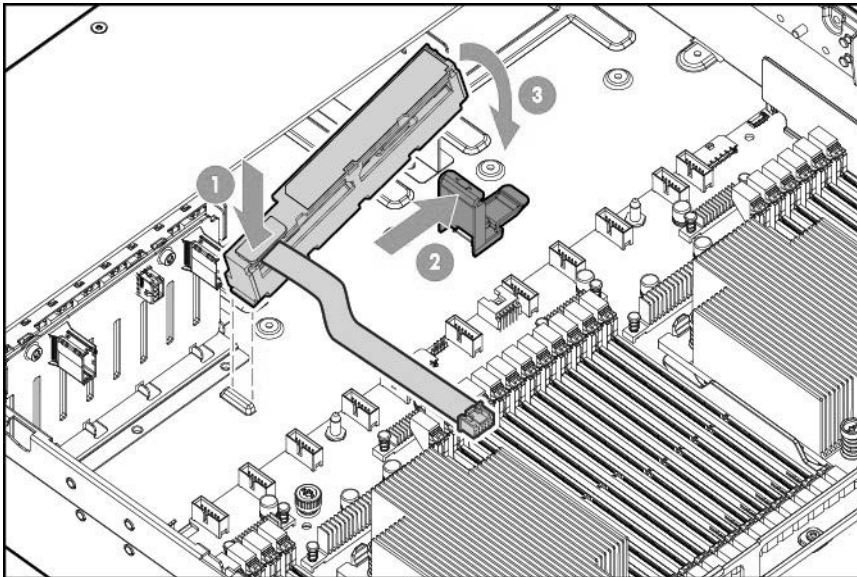
### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit

## Procedure

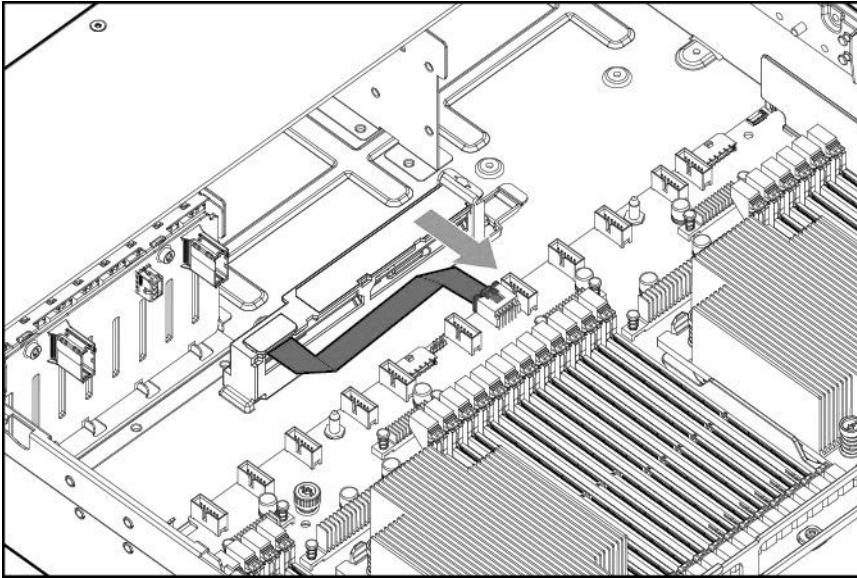
1. Power down the server.
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - Extend the server from the rack.
  - Remove the server from the rack.
4. Remove the access panel.
5. Remove the air baffle.
6. Remove the fan cage.
7. Install the energy pack option.



8. Route and connect the cable.



**CAUTION:** Do not connect the energy pack while the server is operating. Verify that all power to the server has been removed.



9. Install the fan cage.
10. Install the access panel.
11. Install the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server.

## Drive options

### Drive guidelines

Depending on the configuration, the server supports SAS, SATA, and NVMe drives.

Observe the following general guidelines:

- The system automatically sets all drive numbers.
- If only one hard drive is used, install it in the bay with the lowest drive number. For drive numbering, see **Drive bay numbering**.
- The NVMe SSD is a PCIe bus device. Devices attached to a PCIe bus cannot be removed without allowing the device and bus to complete and cease the signal/traffic flow.

Do not remove an NVMe SSD from the drive bay while the Do Not Remove button LED is flashing. The Do Not Remove button LED flashes to indicate that the device is still in use. Removal of the NVMe SSD before the device has completed and ceased signal/traffic flow can cause loss of data.

- Drives with the same capacity provide the greatest storage space efficiency when grouped into the same drive array.

### Supported drive carriers

Depending on the drive cage, the server supports the following drive carriers:

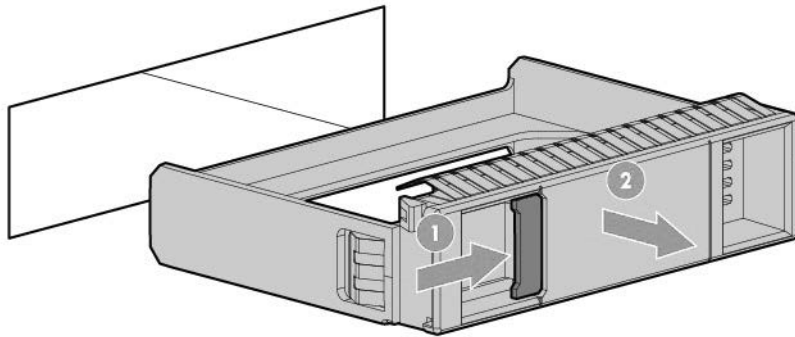


- SFF Smart Carrier (SC)
- SFF Smart Carrier NVMe (SCN)
- SFF Smart Carrier M.2 (SCM)
- LFF Smart Carrier (SC)
- LFF to SFF Smart Carrier Converter

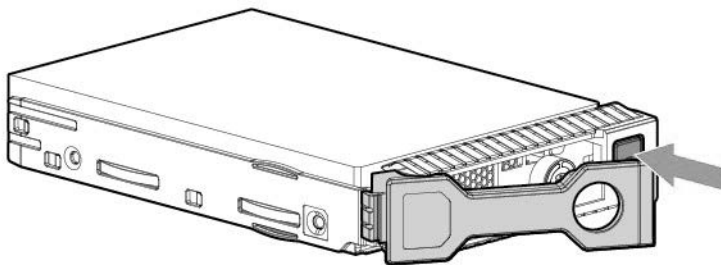
## Installing a hot-plug SAS or SATA drive

### Procedure

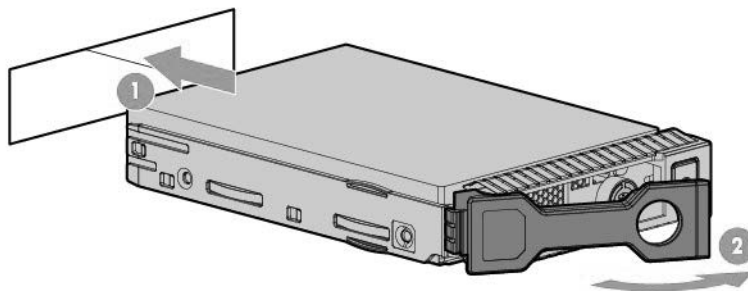
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.



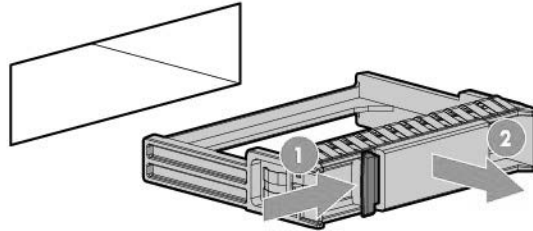
4. Observe the LED status of the drive.

## Installing an NVMe drive

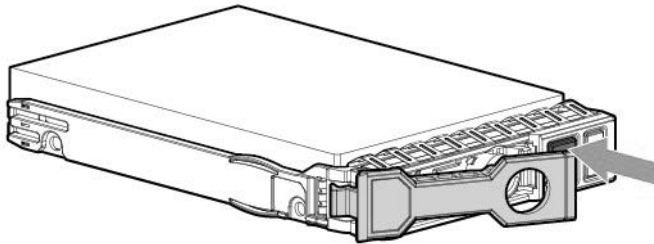
- CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all drive and device bays are populated with either a component or a blank.

### Procedure

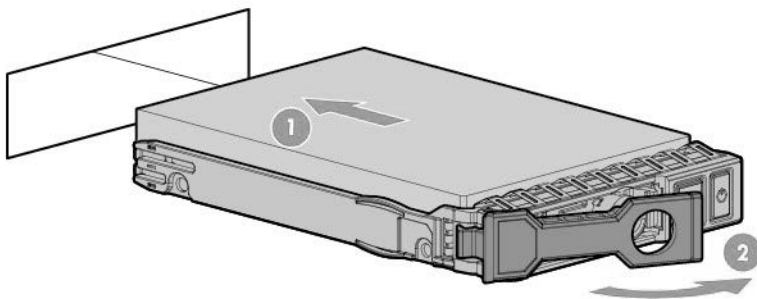
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.

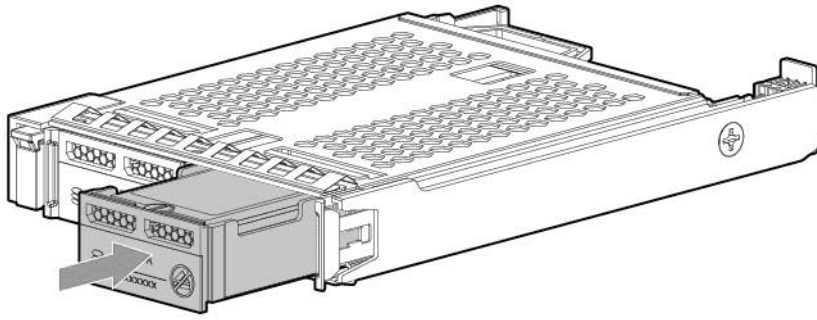


4. Observe the LED status of the drive.

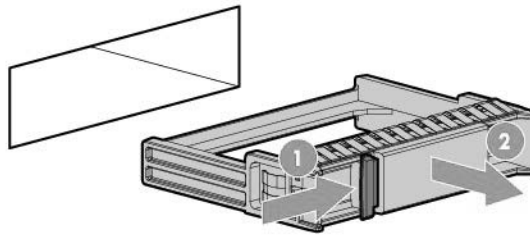
## Installing a uFF drive and SCM drive carrier

### Procedure

1. If needed, install the uFF drive into the drive carrier.

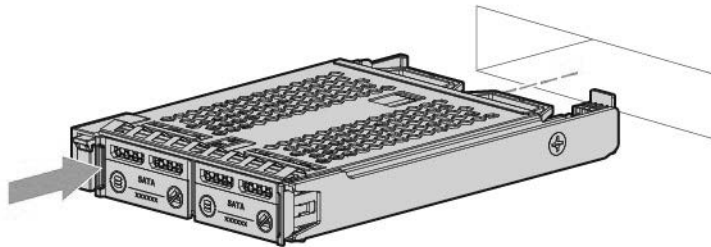


2. Remove the drive blank.



3. Install the drives.

Push firmly near the ejection handle until the latching spring engages with the drive bay.



4. Power on the server.

To configure the drive, use [Smart Storage Administrator](#).

## Installing an M.2 drive

This procedure is for replacing M.2 drives located on an expansion card, riser, or the system board only. Do not use this procedure to replace uFF drives.

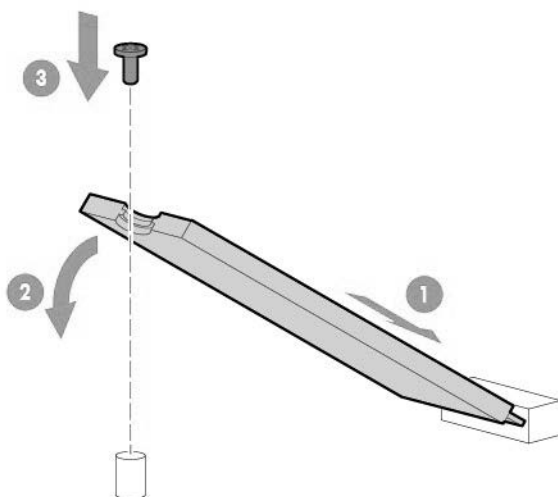
### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

## Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the riser cage.**
6. Install the drive.



The installation is complete.

## Fan options

- 
- ⚠ CAUTION:** To avoid damage to server components, fan blanks must be installed in fan bays 1 and 2 in a single-processor configuration.
- 
- ⚠ CAUTION:** To avoid damage to the equipment, do not operate the server for extended periods of time if the server does not have the optimal number of fans installed. Although the server might boot, Hitachi Vantara does not recommend operating the server without the required fans installed and operating.
- 

Valid fan configurations are listed in the following table.

Configuration	Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6
1 processor	Fan blank	Fan blank	Fan	Fan	Fan	Fan
1 processor 24-SFF or 12-LFF configuration with high-performance fans	Fan	Fan	Fan	Fan	Fan	Fan
2 processors	Fan	Fan	Fan	Fan	Fan	Fan

For a single-processor configuration, excluding 24-SFF and 12-LFF configurations, four fans and two blanks are required in specific fan bays for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

For a dual-processor configuration or single-processor 24-SFF or 12-LFF configurations, six fans are required for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

High-performance fans might be necessary in 24-SFF and 12-LFF configurations for the following installations:

- Optional GPU riser installations
- ASHRAE compliant configurations

For more information, contact customer support.

The server supports variable fan speeds. The fans operate at minimum speed until a temperature change requires a fan speed increase to cool the server. The server shuts down during the following temperature-related scenarios:

- At POST and in the OS, iLO performs an orderly shutdown if a cautionary temperature level is detected. If the server hardware detects a critical temperature level before an orderly shutdown occurs, the server performs an immediate shutdown.
- When the Thermal Shutdown feature is disabled in the BIOS/Platform Configuration (RBSU), iLO does not perform an orderly shutdown when a cautionary temperature level is detected. Disabling this feature does not disable the server hardware from performing an immediate shutdown when a critical temperature level is detected.

---

**⚠ CAUTION:** A thermal event can damage server components when the Thermal Shutdown feature is disabled in the BIOS/Platform Configuration (RBSU).

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## Installing high-performance fans

**⚠ CAUTION:** Caution: To prevent damage server, ensure that all DIMM latches are closed and locked before installing the fans.

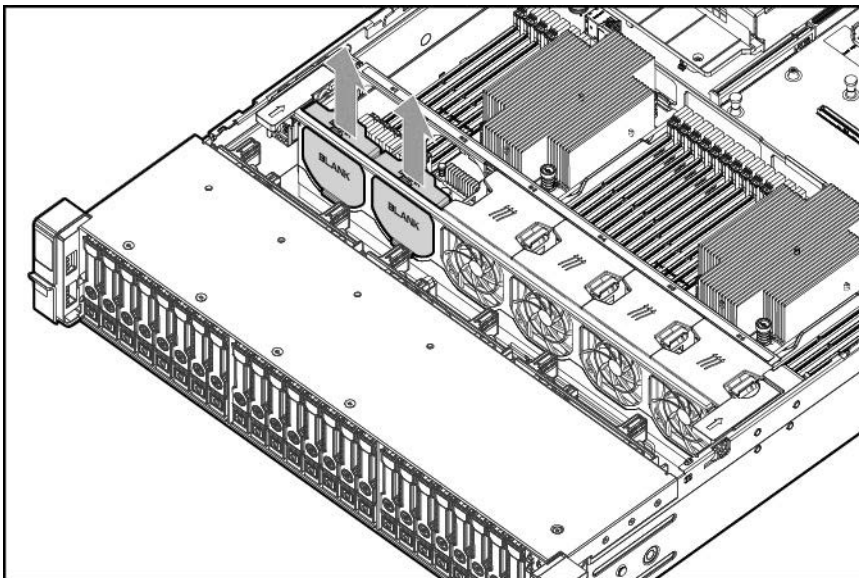
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**⚠ CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

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### Procedure

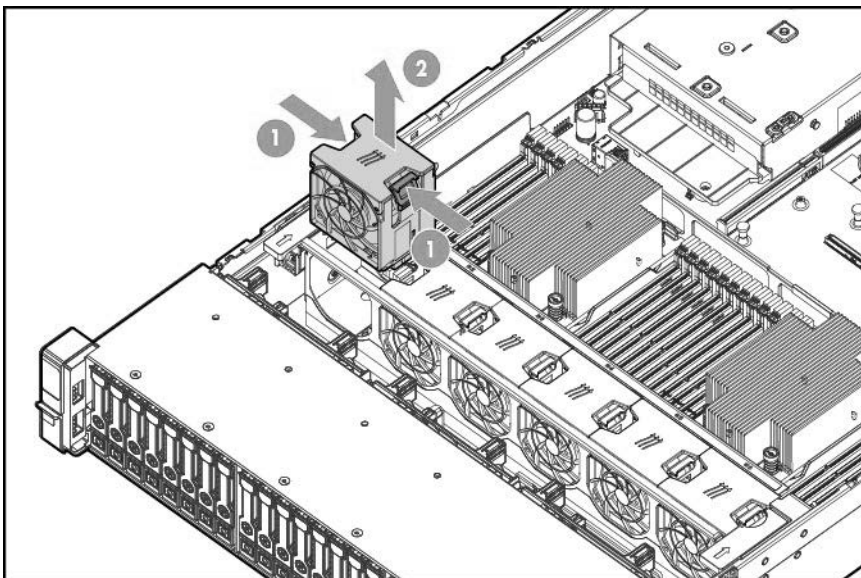
1. Extend the server from the rack.
2. Remove the access panel.
3. If installed, remove all fan blanks.



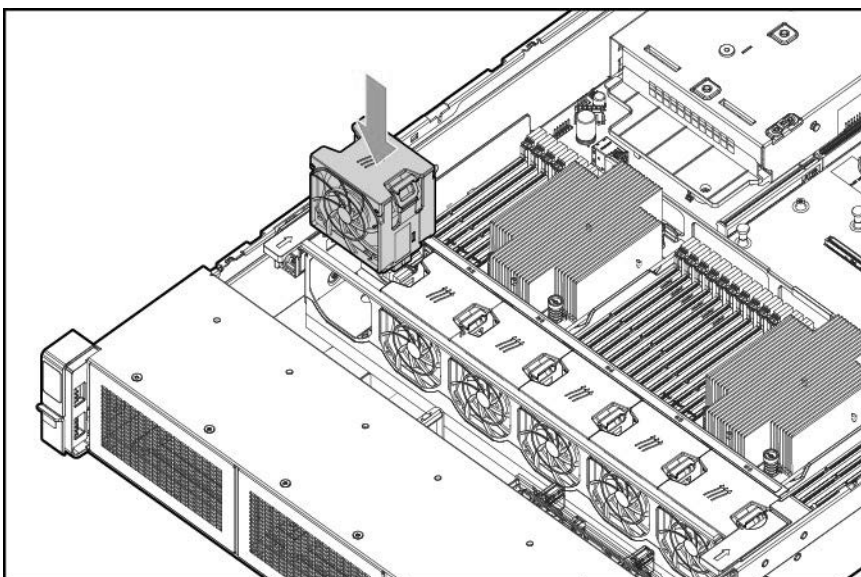
4. Remove the air baffle.
5. Remove all standard fans.

**⚠ IMPORTANT:** Do not mix standard fans and high-performance fans in the same server.

---



6. Install high-performance fans in all fan bays.



7. Install the air baffle.
8. Install the access panel.
9. Install the server into the rack.

# Memory options

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**!** **IMPORTANT:** This server does not support mixing LRDIMMs and RDIMMs. Attempting to mix any combination of these DIMMs can cause the server to halt during BIOS initialization. All memory installed in the server must be of the same type.

---

## DIMM-processor compatibility

The installed processor determines the type of DIMM that is supported in the server:

- First-generation Intel Xeon Scalable processors support DDR4-2666 DIMMs.
- Second-generation Intel Xeon Scalable processors support DDR4-2933 DIMMs.

Mixing DIMM types is not supported. Install only the supported DDR4-2666 or DDR4-2933 DIMMs in the server.

## DIMM and NVDIMM population information

For specific DIMM and NVDIMM population information, contact customer support.

## Installing a DIMM

The server supports up to 24 DIMMs.

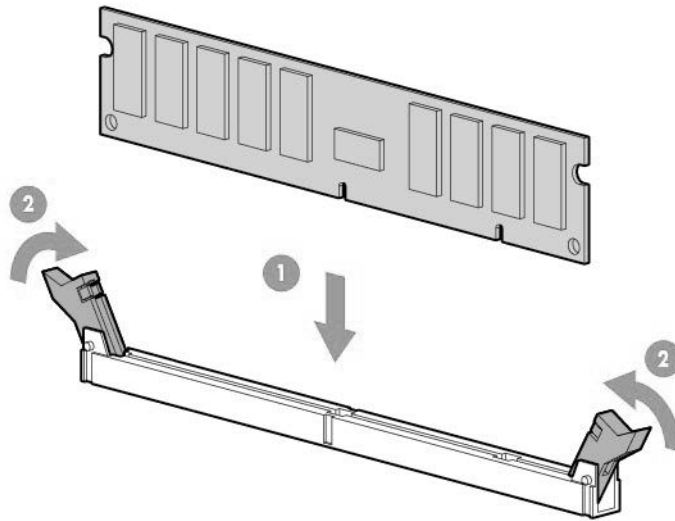
### Prerequisites

Before installing this option, be sure you have the following: The components included with the hardware option kit

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. **Extend the server from the rack.**
  - b. **Remove the server from the rack.**
4. **Remove the access panel.**
5. Open the DIMM slot latches.
6. Install the DIMM.





7. **Install the access panel.**
8. Install the server in the rack.
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. **Power up the server.**

Use the BIOS/Platform Configuration (RBSU) in the UEFI System Utilities to configure the memory mode.

For more information about LEDs and troubleshooting failed DIMMs, see [\*\*Systems Insight Display combined LED description.\*\*](#)

## 16GB NVDIMM option

NVDIMMs are flash-backed NVDIMMs used as fast storage and are designed to eliminate smaller storage bottlenecks. The 16GB NVDIMM for HA800 servers is ideal for smaller database storage bottlenecks, write caching tiers, and any workload constrained by storage bottlenecks.

The 16GB NVDIMM is supported on select HA800 servers with first generation Intel Xeon Scalable processors. The server can support up to 12 NVDIMMs in 2 socket servers (up to 192GB) and up to 24 NVDIMMs in 4 socket servers (up to 384GB). The Smart Storage Battery provides backup power to the memory slots allowing data to be moved from the DRAM portion of the NVDIMM to the Flash portion for persistence during a power down event.

## NVDIMM-processor compatibility

16GB NVDIMMs are only supported in servers with first-generation Intel Xeon Scalable processors installed.


## Server requirements for NVDIMM support

Before installing an 16GB NVDIMM in a server, make sure that the following components and software are available:


- A supported Advanced Server product using Intel Xeon Scalable Processors
- An Smart Storage Battery
- A minimum of one regular DIMM: The system cannot have only NVDIMM-Ns installed.
- A supported operating system with persistent memory/NVDIMM drivers.
- For minimum firmware versions, contact customer support.

## Installing an NVDIMM


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 **CAUTION:** To avoid damage to the hard drives, memory, and other system components, the air baffle, drive blanks, and access panel must be installed when the server is powered up.


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 **CAUTION:** To avoid damage to the hard drives, memory, and other system components, be sure to install the correct DIMM baffles for your server model.


---

 **CAUTION:** DIMMs are keyed for proper alignment. Align notches in the DIMM with the corresponding notches in the DIMM slot before inserting the DIMM. Do not force the DIMM into the slot. When installed properly, not all DIMMs will face in the same direction.


---

 **CAUTION:** Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning this procedure.

---

 **CAUTION:** Failure to properly handle DIMMs can damage the DIMM components and the system board connector. For more information, see the DIMM handling guidelines in the troubleshooting guide for your product.

---

 **CAUTION:** Unlike traditional storage devices, NVDIMMs are fully integrated in with the Advanced Server product. Data loss can occur when system components, such as the processor or Smart Storage Battery, fails. Smart Storage battery is a critical component required to perform the backup functionality of NVDIMMs. It is important to act when Smart Storage Battery related failures occur. Always follow best practices for ensuring data protection.

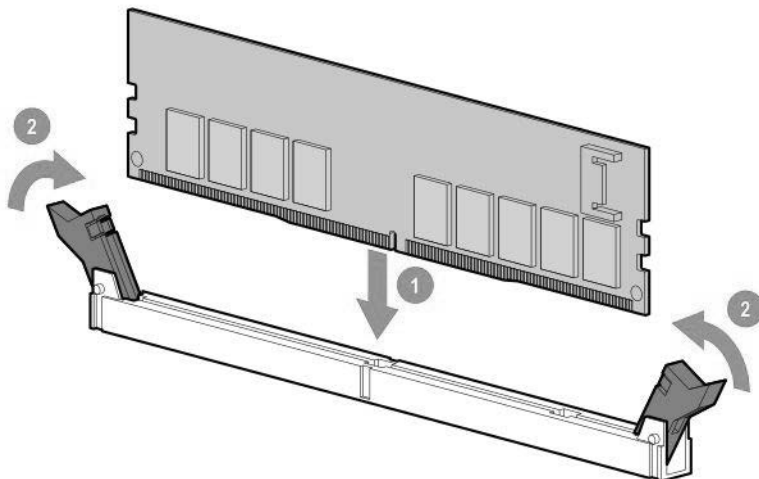
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## Prerequisites

Before installing an NVDIMM, be sure the server meets the [Server requirements for NVDIMM support](#).

## Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. **Extend the server from the rack.**
  - b. **Remove the server from the rack.**
4. **Remove the access panel.**
5. If the Smart Storage battery is not installed, do one of the following:
  - **Remove the air baffle.**
  - **If installed on LFF models, remove the midplane drive cage.**
6. Locate any NVDIMMs already installed in the server.
7. Verify that all LEDs on any installed NVDIMMs are off.
8. Install the NVDIMM.



9. If it is not already installed, **install the Smart Storage battery.**
10. **Install the access panel.**
11. Slide or install the server into the rack.

12. Connect each power cord to the server.
13. **Power up the server.**
14. If required, sanitize the NVDIMM-Ns. For more information, see **NVDIMM sanitization**.

## Configuring the server for NVDIMMs

After installing NVDIMMs, configure the server for NVDIMMs. For information on configuring settings for NVDIMMs contact customer support. The server can be configured for NVDIMMs using either of the following:

- UEFI System Utilities—Use System Utilities through the Remote Console to configure the server for NVDIMM memory options by pressing the **F9** key during POST. For more information about UEFI System Utilities, see the Hitachi Vantara website (<https://knowledge.hitachivantara.com/Documents/Servers>).
- iLO RESTful API for iLO 5—For more information about configuring the system for NVDIMMs, contact customer support.

## NVDIMM sanitization

Media sanitization is defined by NIST SP800-88 Guidelines for Media Sanitization (Rev 1, Dec 2014) as "a general term referring to the actions taken to render data written on media unrecoverable by both ordinary and extraordinary means."

The specification defines the following levels:

- Clear: Overwrite user-addressable storage space using standard write commands; might not sanitize data in areas not currently user-addressable (such as bad blocks and overprovisioned areas)
- Purge: Overwrite or erase all storage space that might have been used to store data using dedicated device sanitize commands, such that data retrieval is "infeasible using state-of-the-art laboratory techniques"
- Destroy: Ensure that data retrieval is "infeasible using state-of-the-art laboratory techniques" and render the media unable to store data (such as disintegrate, pulverize, melt, incinerate, or shred)

The NVDIMM-N Sanitize options are intended to meet the Purge level.

For more information on sanitization for NVDIMMs, contact customer support.

NIST SP800-88 *Guidelines for Media Sanitization* (Rev 1, Dec 2014) is available for download from the NIST website (<http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-88r1.pdf>).

## NVDIMM relocation guidelines

### Requirements for relocating NVDIMMs or a set of NVDIMMs when the data must be preserved

- The destination server hardware must match the original server hardware configuration.
- All System Utilities settings in the destination server must match the original System Utilities settings in the original server.
- If NVDIMM-Ns are used with NVDIMM Interleaving ON mode in the original server, do the following:
  - Install the NVDIMMs in the same DIMM slots in the destination server.
  - Install the entire NVDIMM set (all the NVDIMM-Ns on the processor) on the destination

server. This guideline would apply when replacing a system board due to system failure.

If any of the requirements cannot be met during NVDIMM relocation, do the following:

- Manually back up the NVDIMM-N data before relocating NVDIMM-Ns to another server.
- Relocate the NVDIMM-Ns to another server.
- Sanitize all NVDIMM-Ns on the new server before using them.

#### **Requirements for relocating NVDIMMs or a set of NVDIMMs when the data does not have to be preserved**

If data on the NVDIMM-N or set of NVDIMM-Ns does not have to be preserved, then

- Move the NVDIMM-Ns to the new location and sanitize all NVDIMM-Ns after installing them to the new location. For more information, see [NVDIMM sanitization](#).
- Observe all DIMM and NVDIMM population guidelines. For more information, see [DIMM and NVDIMM population information](#).
- Observe the process for removing an NVDIMM.
- Observe the process for installing an NVDIMM.
- Review and configure the system settings for NVDIMMs. For more information, see [Configuring the server for NVDIMMs](#).

## **Scalable Persistent Memory (CTO only)**

Scalable Persistent Memory is an integrated storage solution that runs at memory speeds with terabyte capacity unlocking new levels of performance for your business workloads. It provides a complete hardware and software solution utilizing the following components:

- DRAM for application performance
  - A tier of flash for persistence
  - A backup power source to move data from DRAM to flash
- Scalable Persistent Memory is ideal for enabling in-memory compute with persistence and any workload that could benefit from low-latency DRAM-level performance.

For configuration details for Scalable Persistent Memory, contact customer support.

## **Persistent Memory option**

Persistent Memory, which offers the flexibility to deploy as dense memory or fast storage and features Intel Optane persistent memory, enables per-socket memory capacity of up to 3.0 TB. Persistent Memory, together with traditional volatile DRAM DIMMs, provide fast, high-capacity, cost-effective memory, and storage to transform big data workloads and analytics by enabling data to be stored, moved, and processed quickly.

Persistent Memory modules use the standard DIMM form factor and are installed alongside DIMMs in a server memory slot. Persistent Memory modules are designed for use only with second-generation Intel Xeon Scalable processors, and are available in the following capacities:

- 128 GB
- 256 GB
- 512 GB

## Persistent Memory module-processor compatibility

Persistent Memory modules are supported only in servers with second-generation Intel Xeon Scalable processors installed.

## Persistent Memory population information

For specific population and configuration information, Contact customer support.

## System requirements for Persistent Memory module support

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**❗ IMPORTANT:** Hitachi Vantara recommends that you implement best practice configurations for high availability (HA) such as clustered configurations.

---

Before installing Persistent Memory modules, make sure that the following components and software are available:

- DDR4 Standard Memory RDIMMs or LRDIMMs (the number will vary based on your chosen configuration).
- Supported firmware and drives:
  - System ROM version 2.10 or later
  - Server Platform Services (SPS) Firmware version 04.01.04.296
  - iLO 5 Firmware version 1.43
  - Innovation Engine Firmware version 2.1.x or later
- A supported operating system:
  - Windows Server 2012 R2 with persistent memory drivers from Hitachi Vantara
  - Windows Server 2016 with persistent memory drivers from Hitachi Vantara
  - Windows Server 2019
  - Red Hat Enterprise Linux 7.6 and later
  - Red Hat Enterprise Linux 8.0 and later
  - SUSE Linux Enterprise Server 12 SP4 and later
  - SUSE Linux Enterprise Server 15 with SUSE-SU-2019:0224-1 or later kernel update
  - SUSE Linux Enterprise Server 15 SP1 with SUSE-SU-2019:1550-1 or later kernel update
  - VMware vSphere 6.7 U2 + Express Patch 10 (ESXi670-201906002) or later (supports App Direct and Memory modes)
  - VMware vSphere 6.5 U3 or later (supports Memory mode)
- Hardware and licensing requirements for optional encryption of the Persistent Memory modules:
  - TPM 2.0 (local key encryption)
  - iLO Advanced License (remote key encryption)
  - Key management server (remote key encryption)

For more information, see the *Persistent Memory User Guide* on the Hitachi Vantara website (<https://knowledge.hitachivantara.com/Documents/Servers>).

## Installing an Persistent Memory module

Use this procedure only for new Persistent Memory module installations. If you are migrating this Persistent Memory module from another server, see the *Persistent Memory User Guide* on the Hitachi Vantara website (<https://knowledge.hitachivantara.com/Documents/Servers>).

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- A T-10 Torx screwdriver might be needed to unlock the access panel.

### Procedure

1. Observe the following alerts:

---

**⚠ CAUTION:** DIMMs and Persistent Memory modules are keyed for proper alignment. Align notches on the DIMM or Persistent Memory module with the corresponding notches in the slot before installing the component. Do not force the DIMM or Persistent Memory module into the slot. When installed properly, not all DIMMs or Persistent Memory modules will face in the same direction.

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**⚠ CAUTION:** Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning this procedure.

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**⚠ CAUTION:** Failure to properly handle Persistent Memory modules can damage the component and the system board connector.

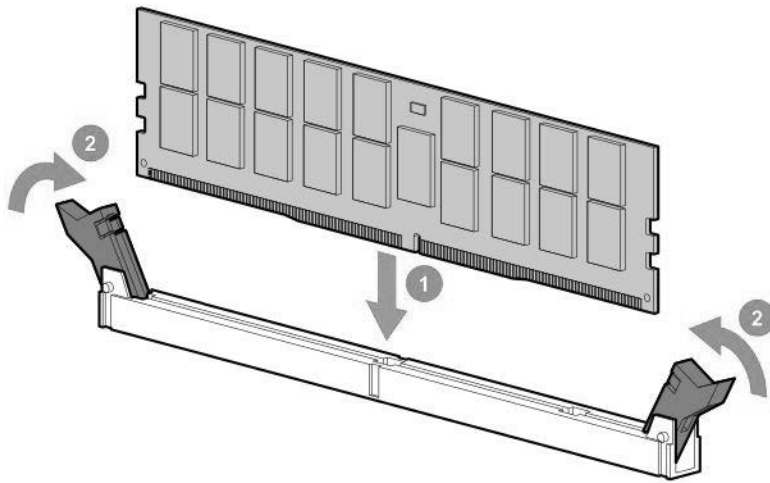
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**❗ IMPORTANT:** Hitachi Vantara recommends that you implement best practice configurations for high availability (HA) such as clustered configurations.

---

2. **Power down the server.**
3. Do one of the following:
  - Extend the server from the rack.
  - Remove the server from the rack, if necessary.
4. Place the server on a flat, level work surface.
5. **Remove the access panel.**
6. Remove all components necessary to access the DIMM slots.
7. Install the Persistent Memory module.



8. Install any components removed to access the DIMM slots.
9. Install the access panel.
10. Slide or install the server into the rack.
11. If removed, reconnect all power cables.
12. Power up the server.
13. Configure the server for Persistent Memory.

For more information, see [Configuring the server for Persistent Memory](#).

## Configuring the server for Persistent Memory

After installing Persistent Memory modules, configure the server for Persistent Memory.

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**!** **IMPORTANT:** Always follow recommendations from your software application provider for high-availability best practices to ensure maximum uptime and data protection.

---

A number of configuration tools are available, including:

- UEFI System Utilities—Access System Utilities through the Remote Console to configure the server by pressing the **F9** key during POST.
- iLO RESTful API—Use the iLO RESTful API through tools such as the RESTful Interface Tool (ilorest) or other third-party tools.
- Persistent Memory Management Utility—The Persistent Memory Management Utility is a desktop application used to configure the server for Persistent Memory, as well as evaluate and monitor the server memory configuration layout.

For more information, see the *Persistent Memory User Guide* on the Hitachi Vantara website (<https://knowledge.hitachivantara.com/Documents/Servers>).



# Controller options

The server supports the following storage controllers:

- Embedded controllers  
Enabled through System Utilities and configured through Smart Storage Administrator (Intelligent Provisioning).
- Type-a controllers  
Type-a controllers install in the type-a smart array connector.
- Type-p controllers  
Type-p controllers install in a PCIe expansion slot.

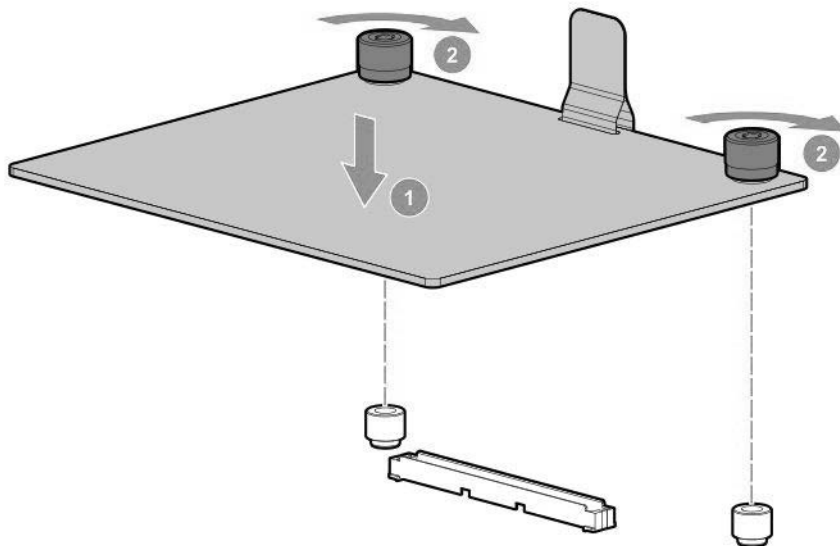
## Installing a storage controller

### Prerequisites

Before you perform this procedure, make sure that you have the components included with the hardware option kit.

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Do one of the following:
  - **Remove the air baffle.**
  - **If installed, remove the 4 LFF midplane drive cage.**
6. Do one of the following:
  - For Type-a Smart array controllers, install the controller in the Smart array modular controller connector.



- For Type-p Smart array controllers, install the controller in a compatible expansion slot.

#### Cable the controller.

The installation is complete.

## Installing a Smart array P824i-p MR controller in a configured server

### Procedure

1. Back up data on the system.
2. Close all applications.
3. Update the server firmware if it is not the latest revision.
4. Do one of the following:
  - If the new Smart array is the new boot device, install the device drivers.
  - If the new smart array is not the new boot device, go to the next step.

---

**NOTE:** If the logical drive is used in a smart array SR controller RAID array, you are not able to boot from that device if you are attached to a smart array MR controller.

---

5. Ensure that users are logged off and all tasks are completed on the server.
  6. Power down the server.
- 

**⚠ CAUTION:** In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

---

7. Power down all peripheral devices that are attached to the server.
  8. Disconnect the power cord from the power source.
  9. Disconnect the power cord from the server.
  10. Remove or open the access panel.
-



**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

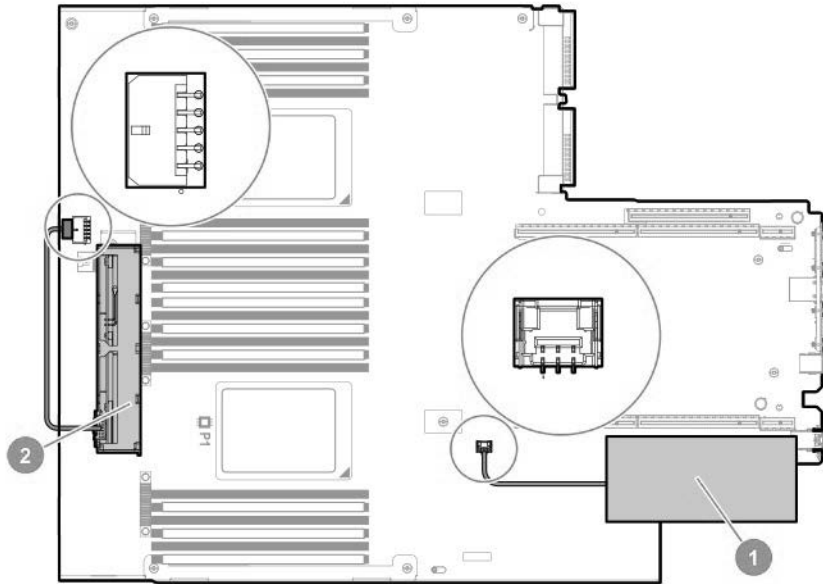
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11. Remove the riser.
12. Select an available x8 or larger PCIe expansion slot.  
A x8 physical size slot is required, even though the slot width may be electrically x4 or x1. Hitachi Vantara recommends to use slot that is electrically x8.
13. Remove the slot cover.  
Save the retaining screw, if one is present.
14. Slide the controller along the slot alignment guide, if one is present, and then press the board firmly into the expansion slot so that the contacts on the board edge are seated properly in the slot.
15. Secure the controller in place with the retaining screw. If the slot alignment guide has a latch (near the rear of the board), close the latch.
16. Connect the controller backup power cable.



**IMPORTANT:** To enable SmartCache or CacheCade in a P-class type-p smart array controller, you must:

- Connect the controller backup power cable to the controller backup power connector on the system or riser board.
  - Connect the energy pack cable to the energy pack connector on the system board.
-



17. Connect storage devices to the controller.  
For cabling information, see the server user guide.
18. Install the Smart Storage Battery or Smart Storage Hybrid Capacitor.
19. Reinstall the riser.
20. Connect peripheral devices to the server.
21. Connect the power cord to the server.
22. Connect the power cord to the power source.
23. Power up all peripheral devices.
24. Power up the server.

## Array and controller configuration

During the initial provisioning of the server, you must configure the controller using the smart array configuration utility in UEFI System Utilities.

After the initial provisioning of the server, you can use any of the following options to configure the arrays and controllers:

- UEFI System Utilities
- MR Storage Administrator
- StorCLI

MR Storage Administrator and StorCLI are available in the Service Pack for Advanced Server (SPV).

For more information about using each configuration utility, see the documentation for the configuration utility.

---

**NOTE:**

- Any RAID configuration created for the smart array MR controller is not available to smart array SR controllers.
  - The message "Data Protection disabled" in the logical drive properties can be ignored as it refers to a feature not currently supported by the MR Storage Administrator product.
- 

## Installing a Universal Media Bay

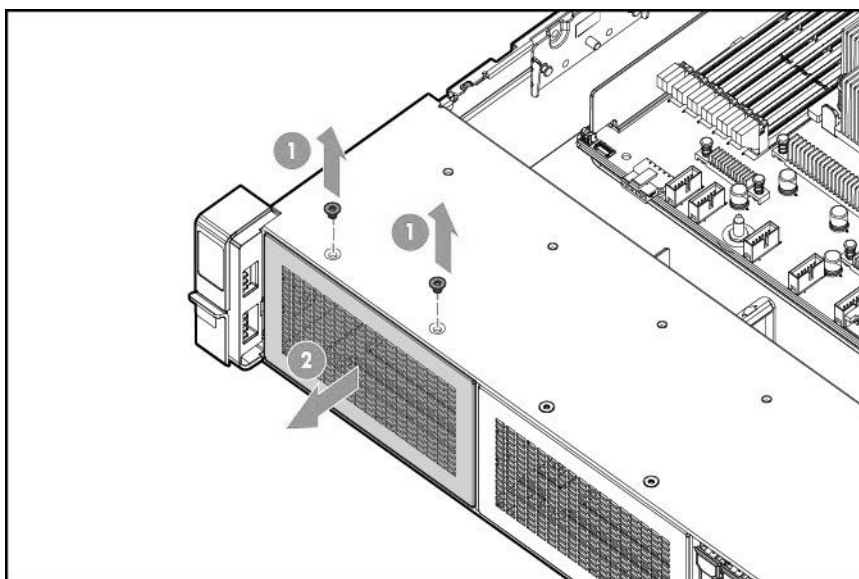
### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

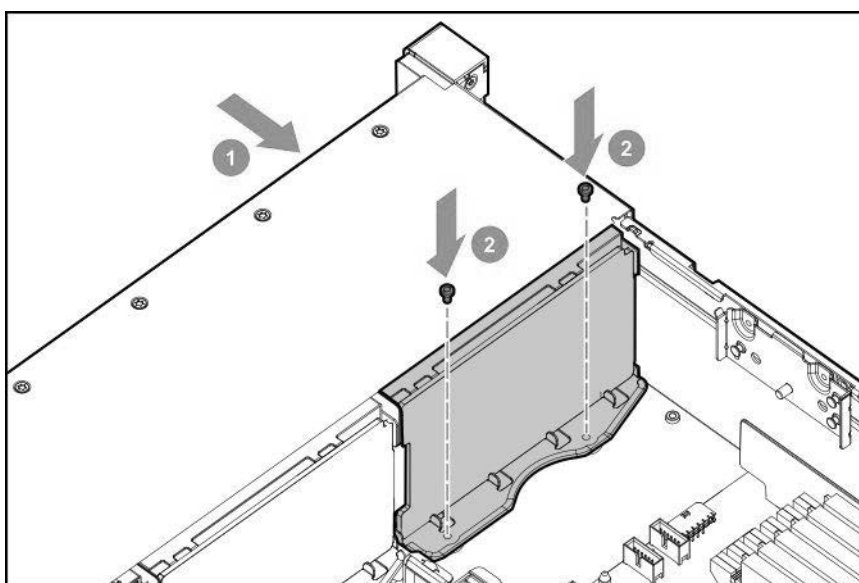
- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

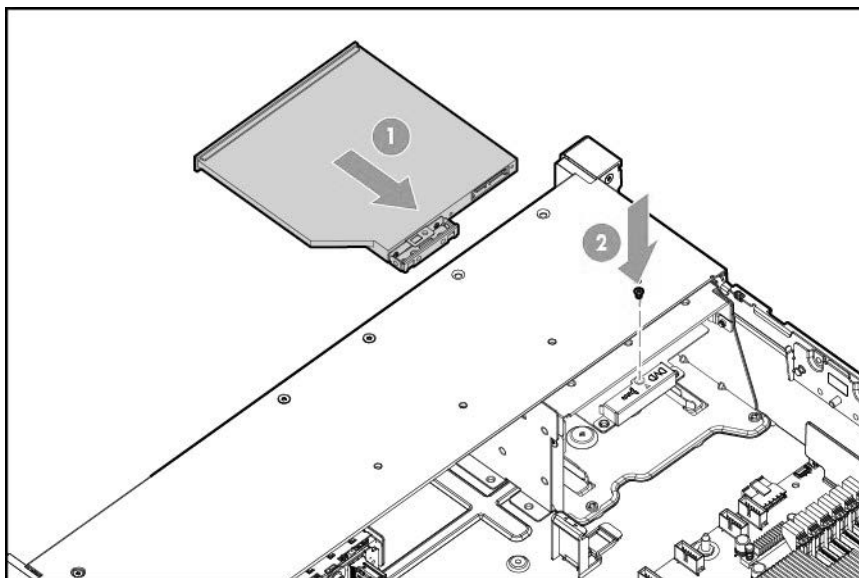
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the bay blank.



8. Route the USB and video cables through the opening.
9. If installing a two-bay SFF front drive cage, install the drive cage.
10. Install the universal media bay.



11. (Optional) Install the optical disc drive.



12. Connect the cables.
  13. **Install the fan cage.**
  14. **Install the air baffle.**
  15. **Install the access panel.**
  16. Slide the server into the rack.
  17. Connect each power cord to the server.
  18. Connect each power cord to the power source.
- Power up the server.**

The installation is complete.

# Drive cage options

## Installing a front 8NVMe SSD Express Bay drive cage

Observe the following:

- The drive cage can be installed in any box. This procedure covers installing the drive cage in box 1.
- When installing in box 1, the NVMe riser must be installed in the tertiary PCIe slot.
- When installing in box 2, the NVMe riser must be installed in the secondary PCIe slot.
- When installing in box 3, the NVMe riser must be installed in the primary PCIe slot.

### Prerequisites

An associated NVMe riser and high-performance fans are required when installing this option.

### Procedure

1. Observe the following alerts.



**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

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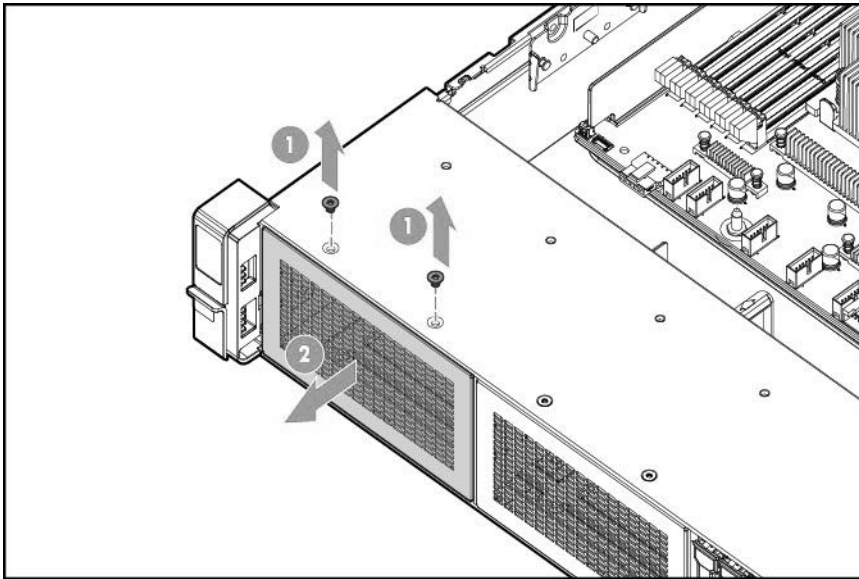


**CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

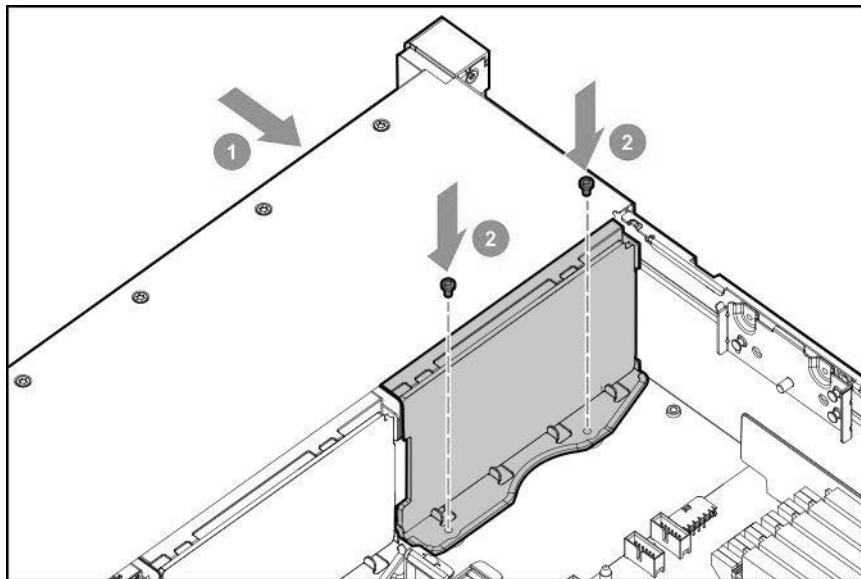
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2. **Power down the server.**
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the blank.





8. Install the drive cage:
  - a. Remove all drives and drive blanks.
  - b. Install the drive cage.



9. Install the associated NVMe riser.
10. Connect the power cable to the drive backplane power connector.
11. Connect the data cables from the drive backplane to the NVMe riser.  
Install drives or drive blanks.

The installation is complete.

## Installing a front 6SFF SAS/SATA + 2NVMe Premium drive cage

The drive cage can be installed in any box. This procedure covers installing the drive cage in box 1.

### Prerequisites

A storage controller and high-performance fans are required when installing this drive cage.

### Procedure

1. Observe the following alerts.

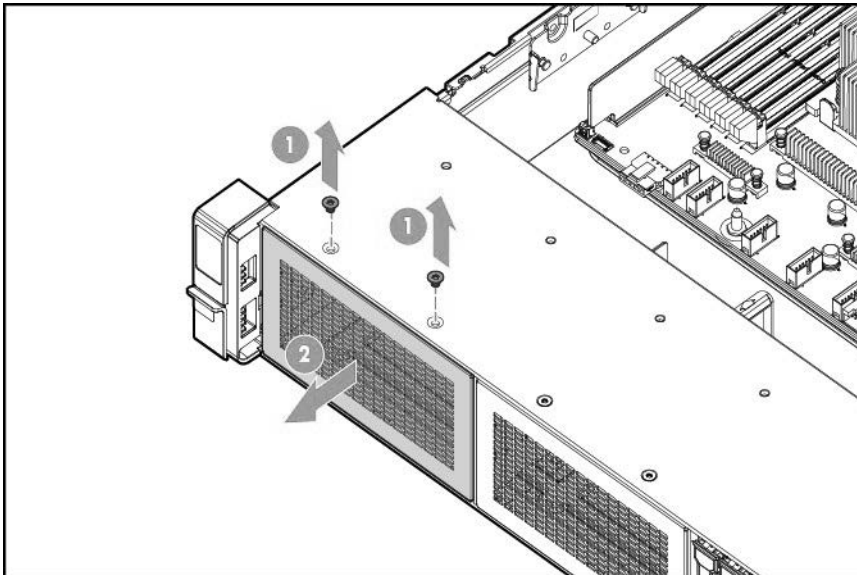


**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.



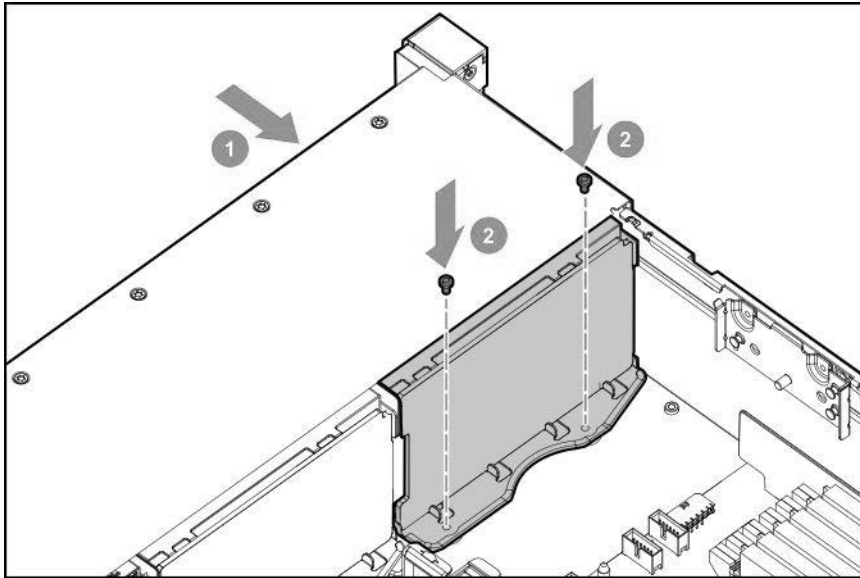
**CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

2. **Power down the server.**
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the blank.



8. Install the drive cage:
  - a. If drive blanks are installed in the drive cage assembly, **remove the drive blanks.** Retain the drive blanks for use in empty drive bays.

- b. Install the drive cage.



9. Connect the power cable.
10. Install a storage controller.
11. Connect the data cables from the drive backplane to the controller.  
Install drives or drive blanks.

The installation is complete.

## Installing airflow labels

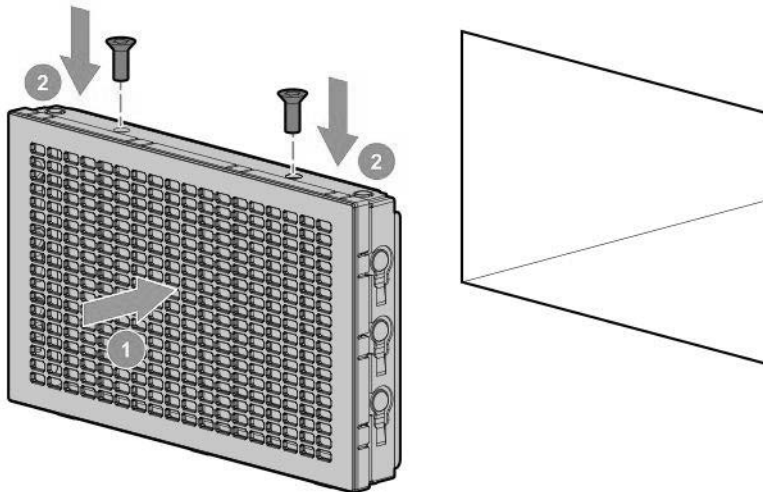
When an Express Bay drive cage is installed, airflow labels might be required:

### Prerequisites

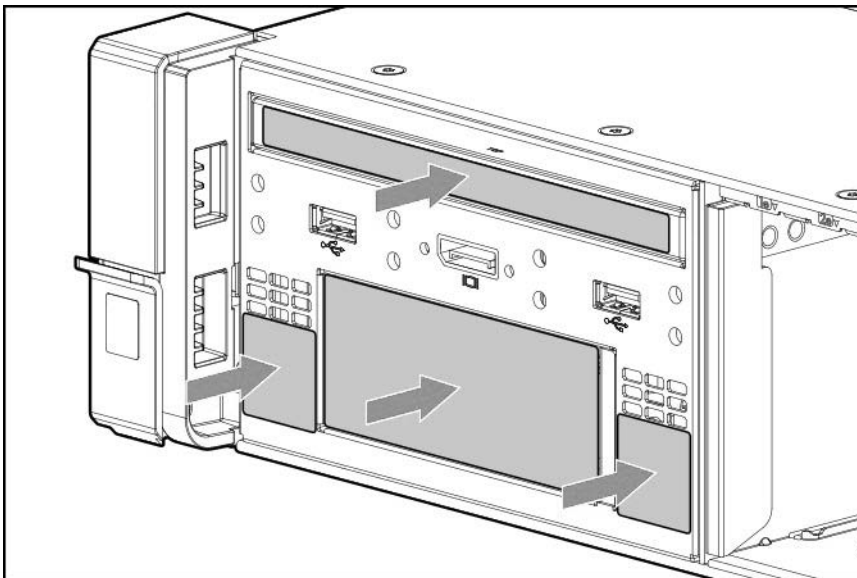
Before you perform this procedure, make sure that you have the components included with the hardware option kit.

### Procedure

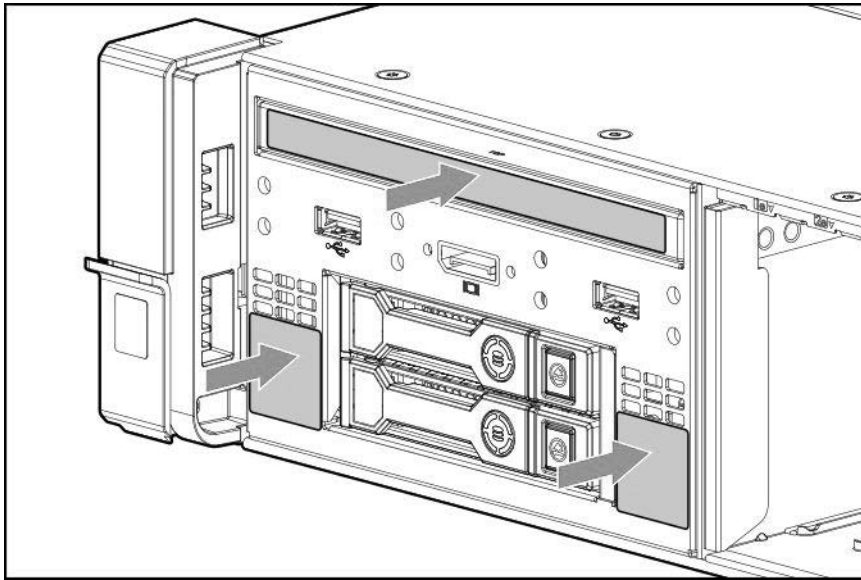
- If an eight-bay SFF drive cage is installed in box 1, then airflow labels are not required.
- If a blank is installed in box 1, replace it with the blank that comes with the kit.



- If a Universal Media Bay is installed in box 1, do one of the following:
  - If the 2 SFF drive cage is not installed, then install airflow labels as shown.



- If a 2 SFF drive cage is installed, then install the airflow labels as shown.



## Installing a front 8SFF SAS/SATA drive cage in box 1

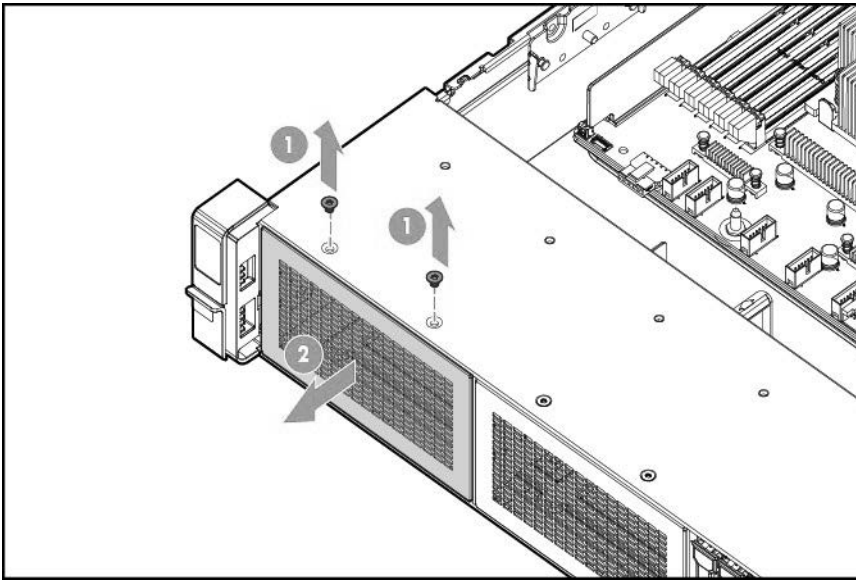
### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

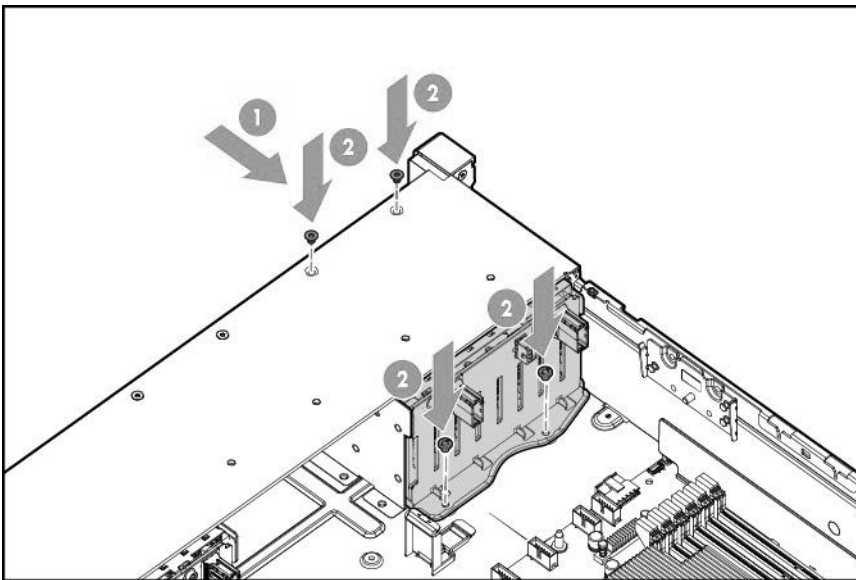
- T-10 Torx screwdriver
- The components included with the hardware option kit

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the bay blank.



8. Install the 8SFF front drive cage option.

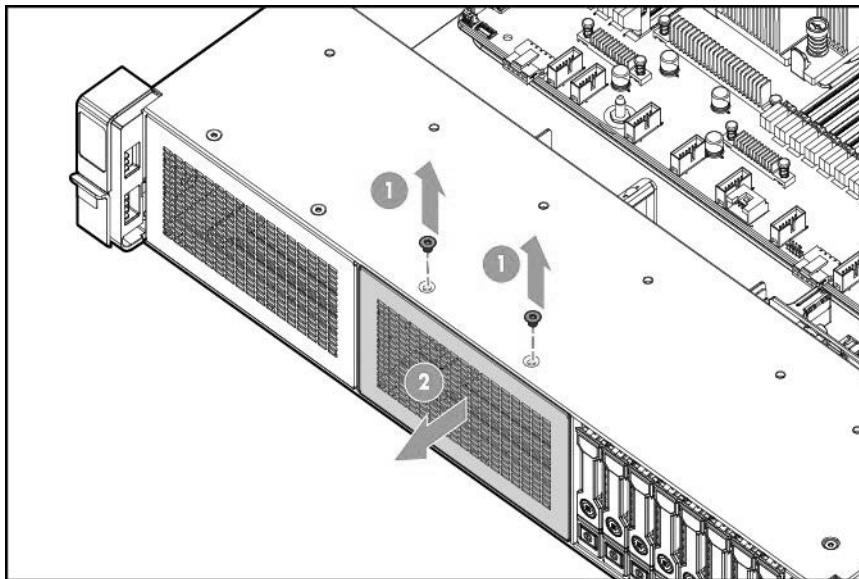


9. Connect the power and data cables.
10. Install the fan cage.
11. Install the air baffle.
12. Install the access panel.
13. Slide the server into the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the Server.  
The installation is complete.

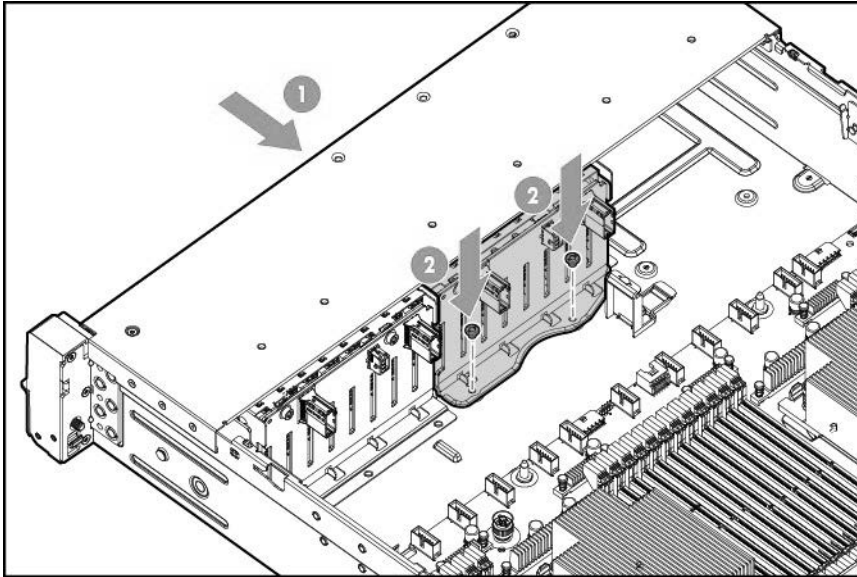
## Installing a front 8SFF SAS/SATA drive cage in box 2

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the bay blank.



8. Install the 8SFF front drive cage option.



9. **Connect the power and data cables.**
  10. **Install the fan cage.**
  11. **Install the access panel.**
  12. Slide the server into the rack.
  13. Connect each power cord to the server.
  14. Connect each power cord to the power source.
- Power up the server.**  
The installation is complete.

## Installing a front 2SFF NVMe/SAS/SATA Premium drive cage

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit
- This installation requires a universal media bay.

### Procedure

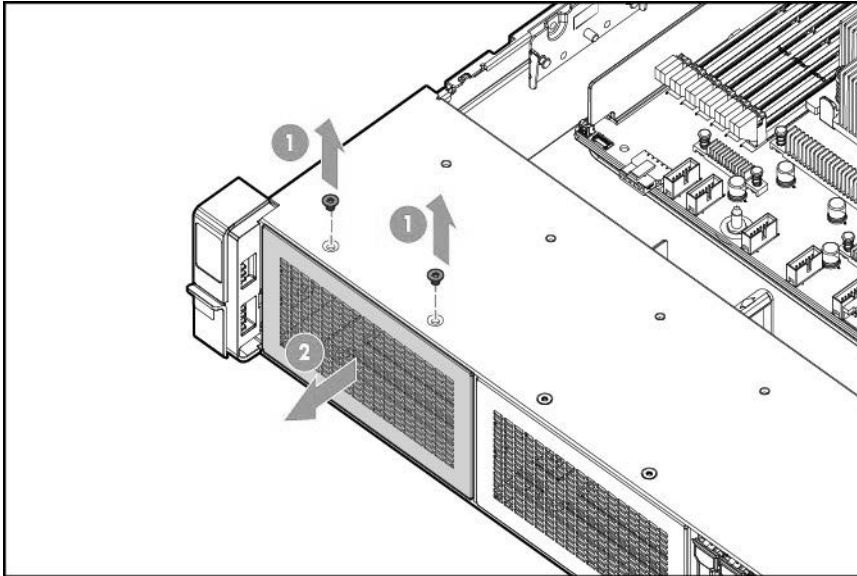
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:



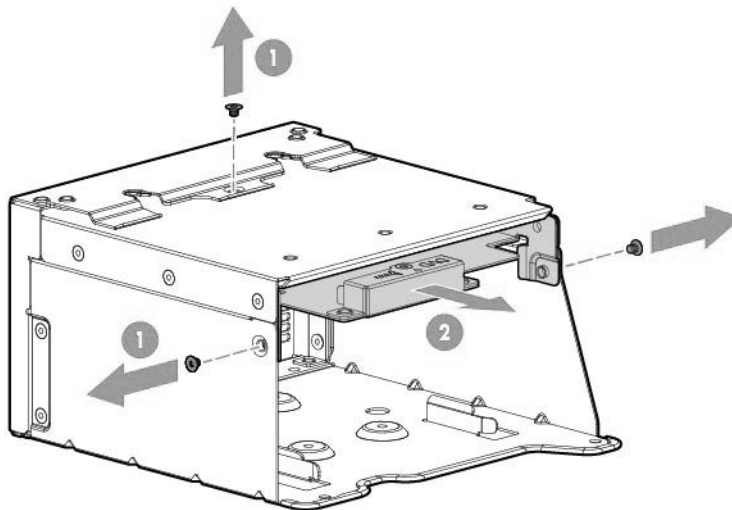
- Extend the server from the rack.
- Remove the server from the rack.

4. Remove the access panel.

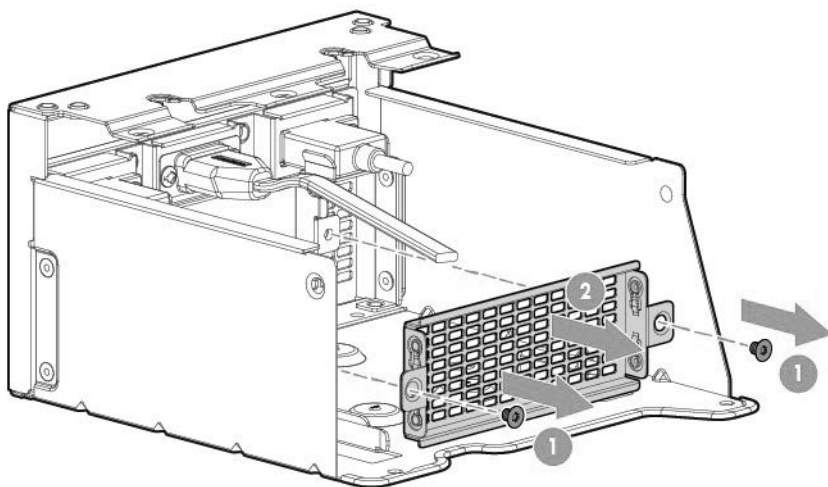
5. Remove the front bay blank.



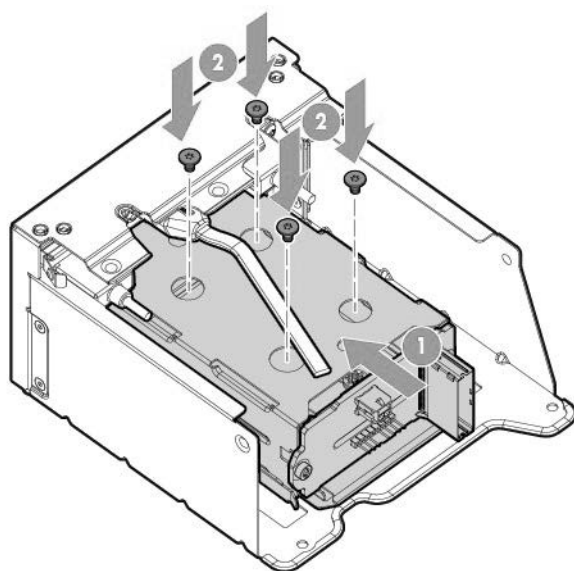
6. Remove the optical disc drive from the universal media bay.



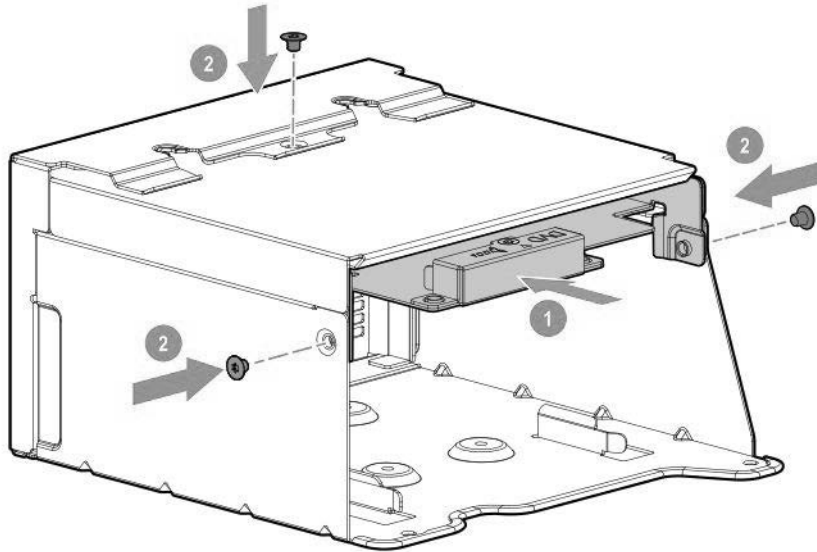
7. Remove the SFF drive blank from the universal media bay.



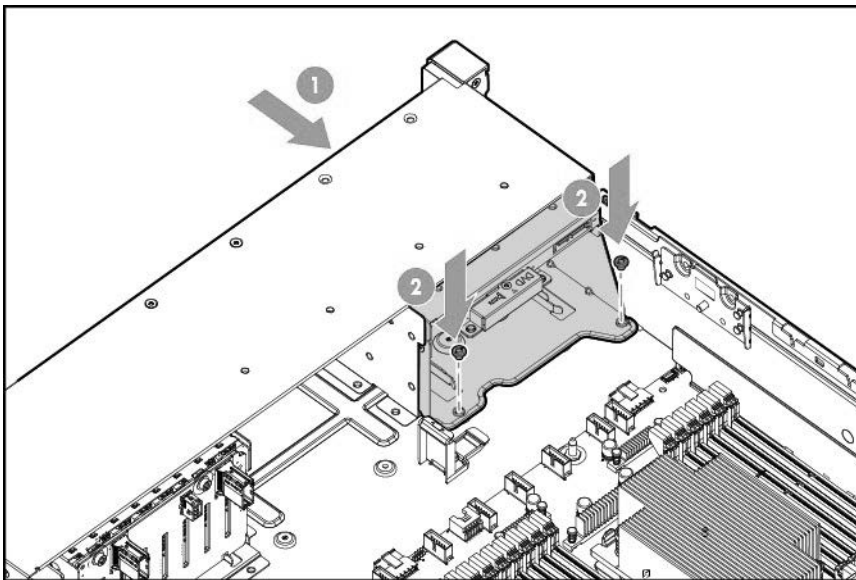
8. Install the drive cage into the universal media bay.



9. Install the optical disc drive in the universal media bay.



10. Install the universal media bay.



11. **Connect the power and data cables.**
12. **Install the access panel.**
13. Slide the server into the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. **Power up the server.**

The installation is complete.

## Installing a midplane 4LFF SAS/SATA drive cage

Observe the following:

- A 1U heatsink is required for each processor when installing this option.
- If you have a TPM, install it prior to this option.
- If you have a type-a controller, install it prior to this option.

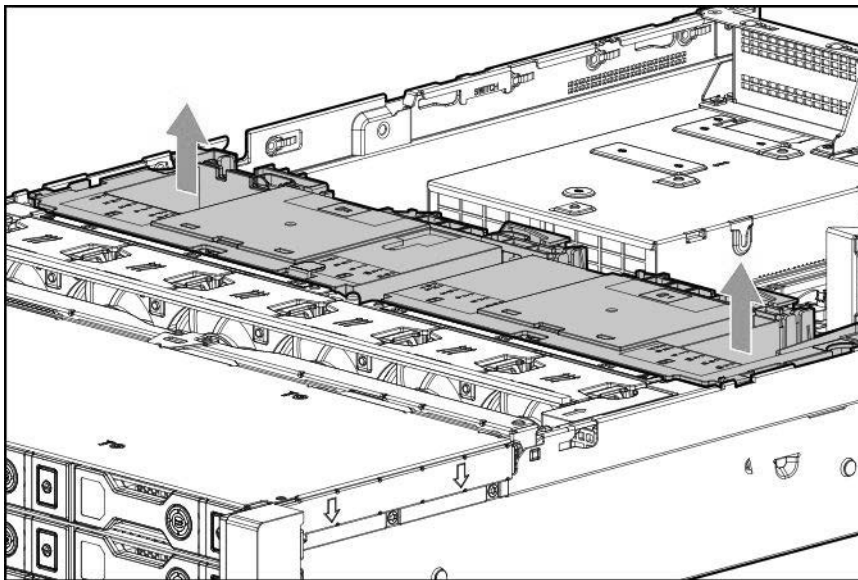
### Prerequisites

Before you perform this procedure, make sure that you have the following items available: The components included with the hardware option kit.

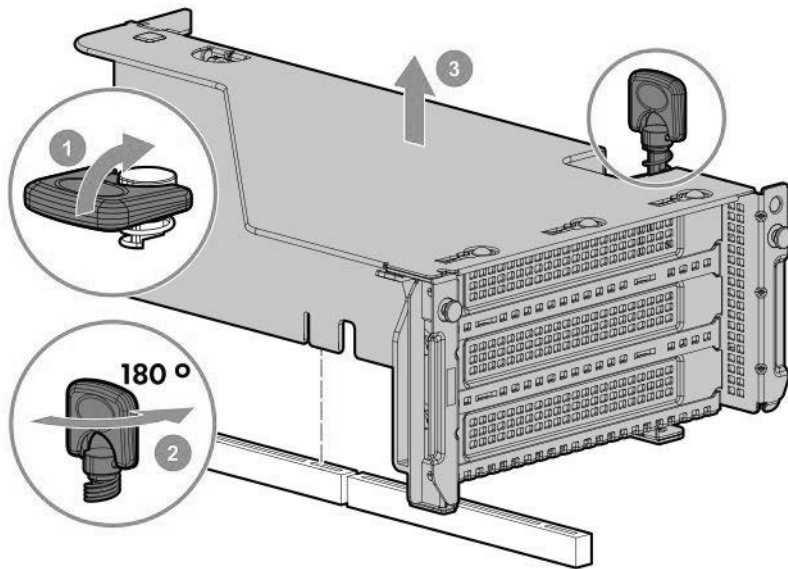
### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**

The air baffle is no longer needed. The drive cage acts as an air baffle for the server.



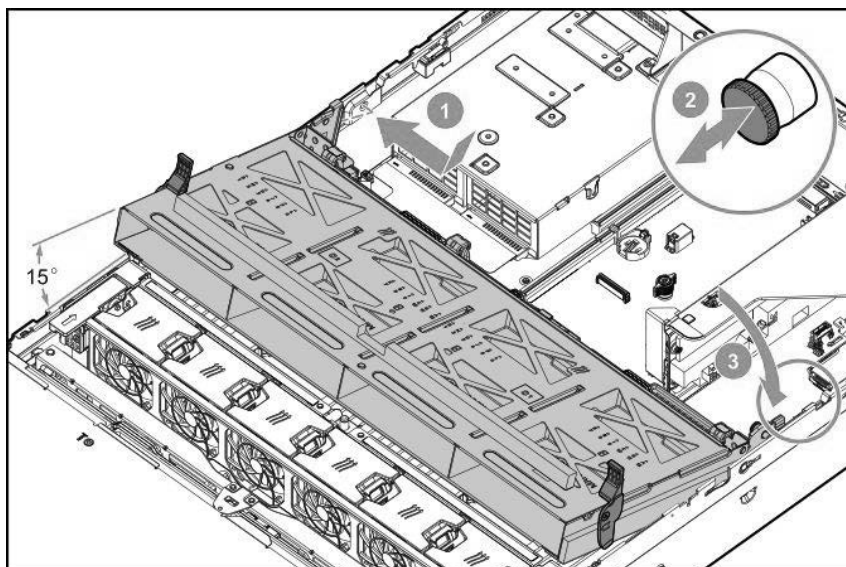
6. Remove all riser cages.



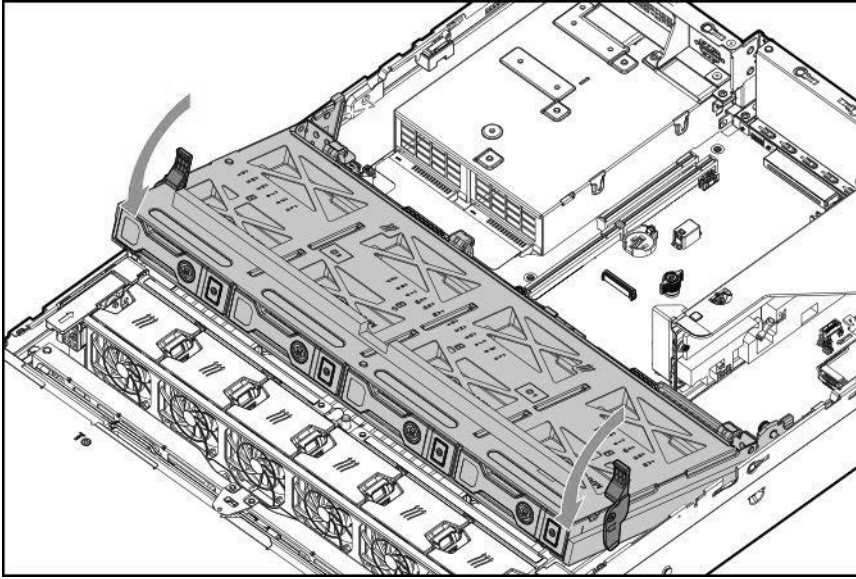
7. Connect the power cable to the drive backplane power connector on the system board.
8. If connecting the data cable to the system board or a controller, connect the data cable.
9. Prepare the drive cage for installation by lifting the latches on the drive cage.
10. Install the drive cage:

**⚠ CAUTION:** Do not drop the drive cage on the system board. Dropping the drive cage on the system board might damage the system or components. Remove all drives and use two hands when installing or removing the drive cage.

- a. Locate the alignment pins on the rear of the drive cage.
- b. Align the pin on the rear left of the drive cage to the server and then insert the pin.
- c. Gently lower the opposite side of the drive cage.
- d. Pull the plunger pin on the rear right of the drive cage and then lower the drive cage until the plunger pin engages.



11. Install drives or drive blanks.
12. Push down on the latches to lower the drive cage into place.



13. Connect the power and data cables to the drive

backplane. The installation is complete.

## Installing a rear 2SFF SAS/SATA drive cage in the primary or secondary riser

### Prerequisites

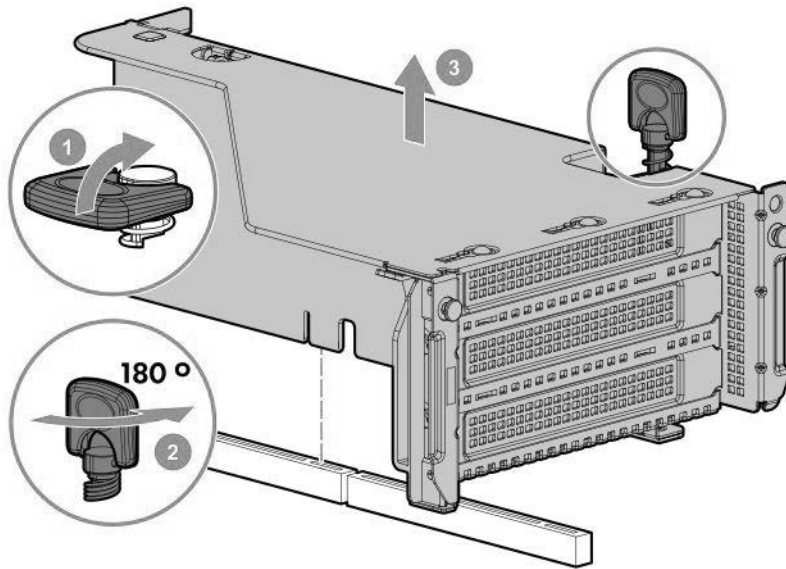
Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit
- The front drive bays are fully populated with 12 LFF or 24 SFF drives.
- High performance fans are installed in all fan bays.

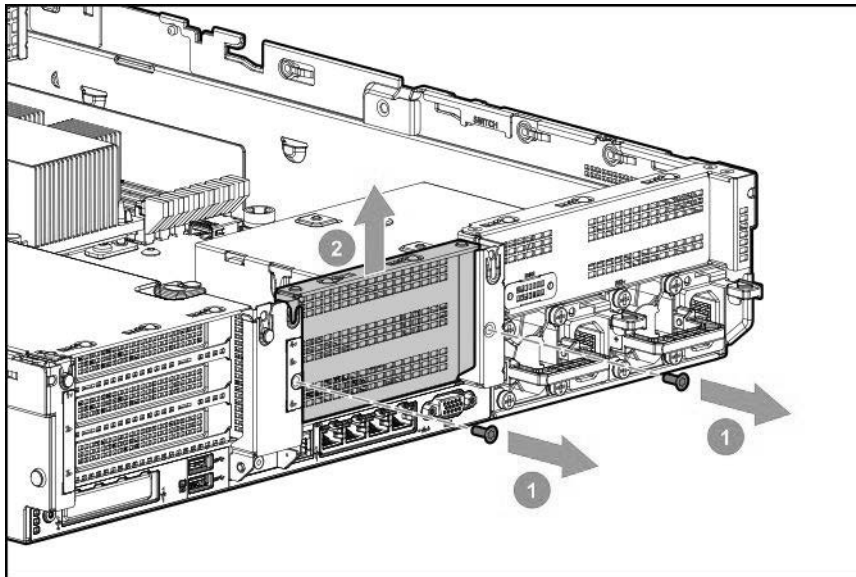
### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**

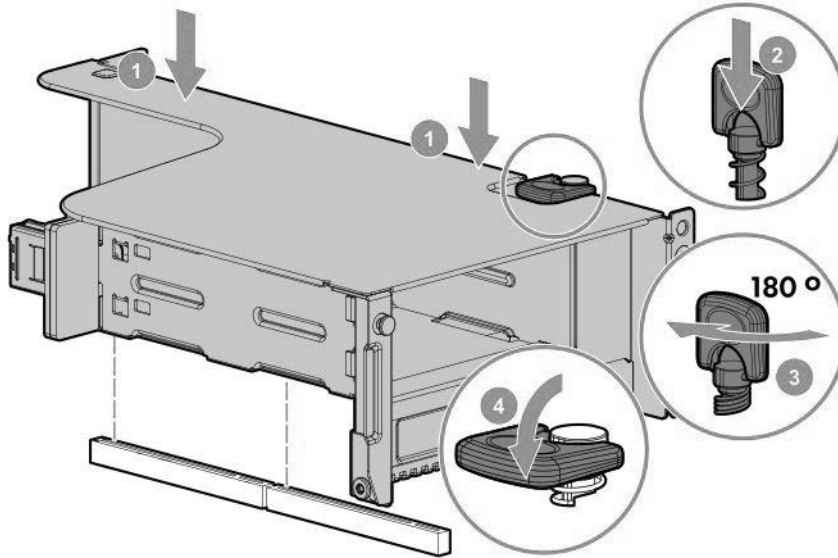
5. Do one of the following:  
For primary bays, remove the riser cage.



For secondary bays, remove the rear wall blank.



6. Install a SAS expander or other expansion card, if needed.  
7. Install the drive cage.



8. **Cable the drive backplane.**
9. **Install drives or drive blanks.**
10. **Install the access panel.**
11. Slide the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server.**

The installation is complete.

## Installing a rear 2 SFF SAS/SATA drive cage over the power supplies

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit
- The front bays are fully populated with 12 LFF or 24 SFF drives
- High-performance fans are installed in all fan bays

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.



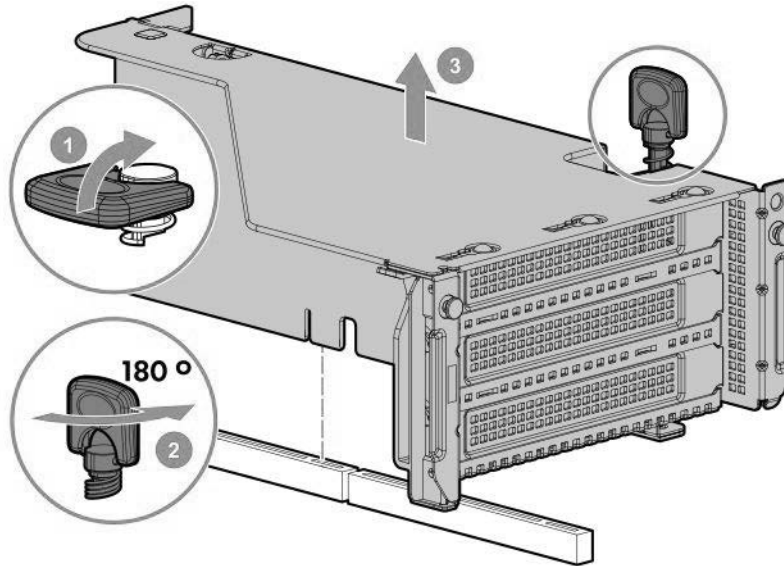
3. Do one of the following:

- Extend the server from the rack.
- Remove the server from the rack.

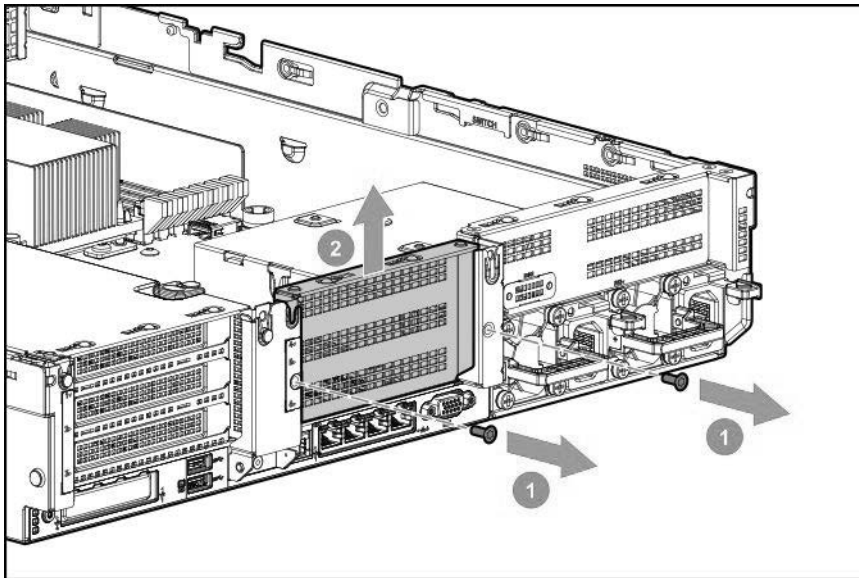
4. Remove the access panel.

5. Do one of the following:

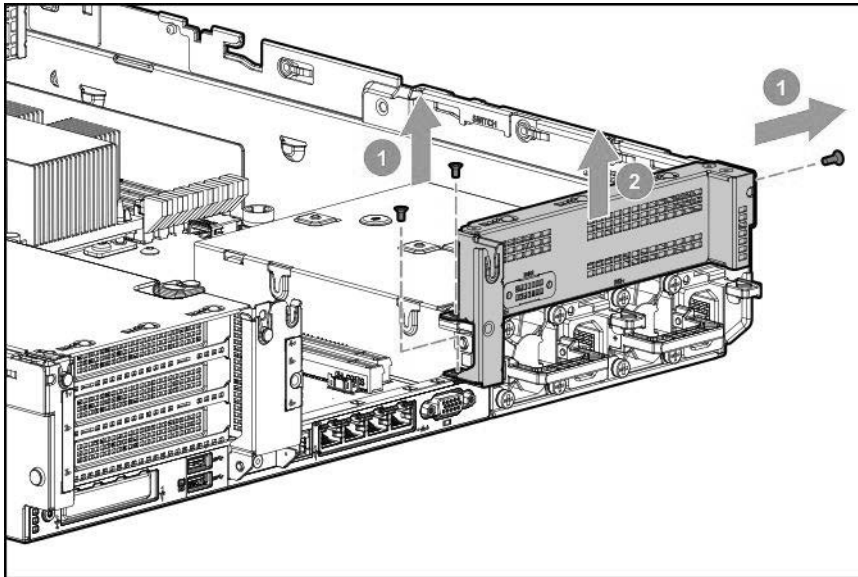
- If installed, remove the secondary riser cage.



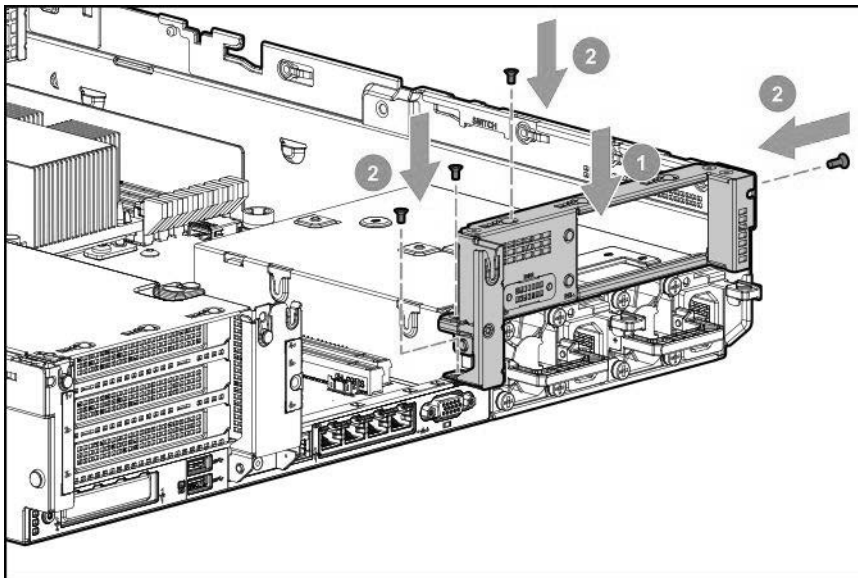
- Remove the secondary wall blank.



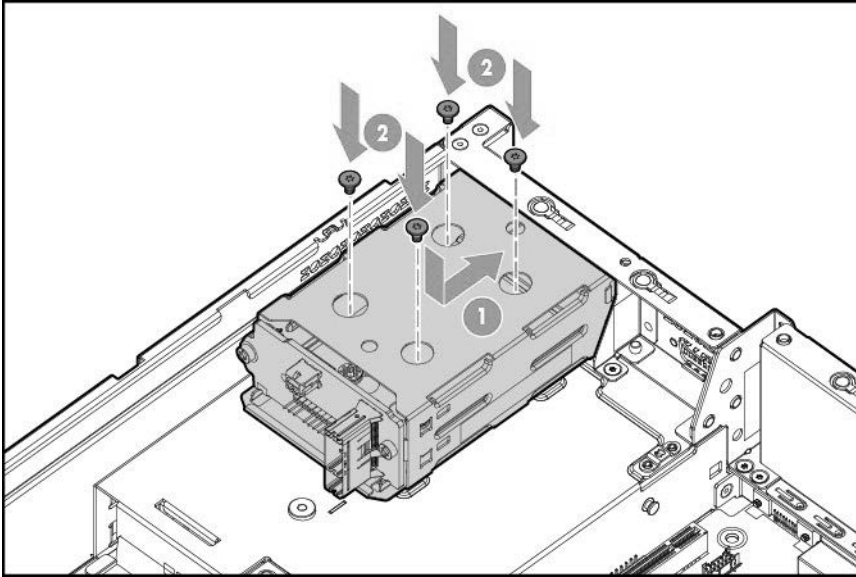
6. Remove the tertiary wall blank.



7. Install the drive cage compatible rear wall.



8. Install the drive cage.



9. Install drives or drive blanks.
10. Install the secondary riser cage or rear wall.
11. **Cable the drive backplane.**
12. **Install the access panel.**
13. Slide the server into the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. **Power up the server.** The installation is complete.

## Installing a rear 3LFF SAS/SATA drive cage

Before installing this option, the front bays must be fully populated with 12 LFF drives. High-performance fans must be installed in all fan bays.

### Prerequisites

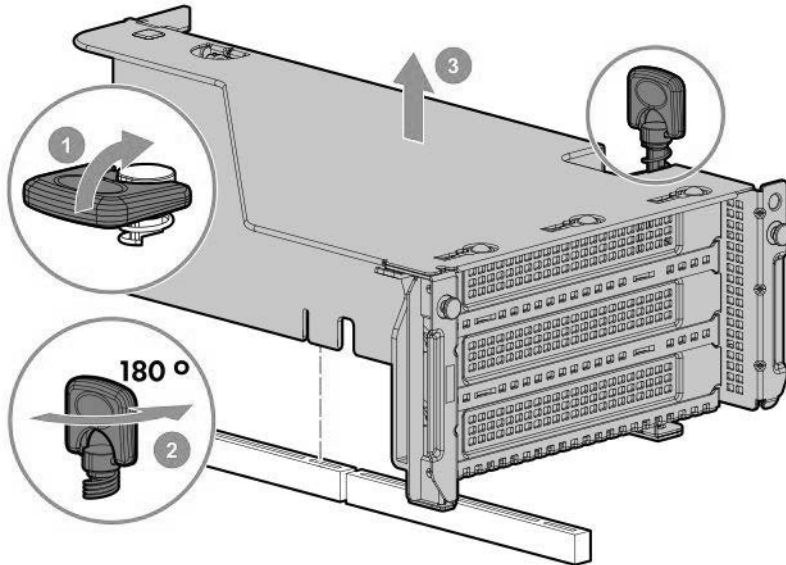
Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit

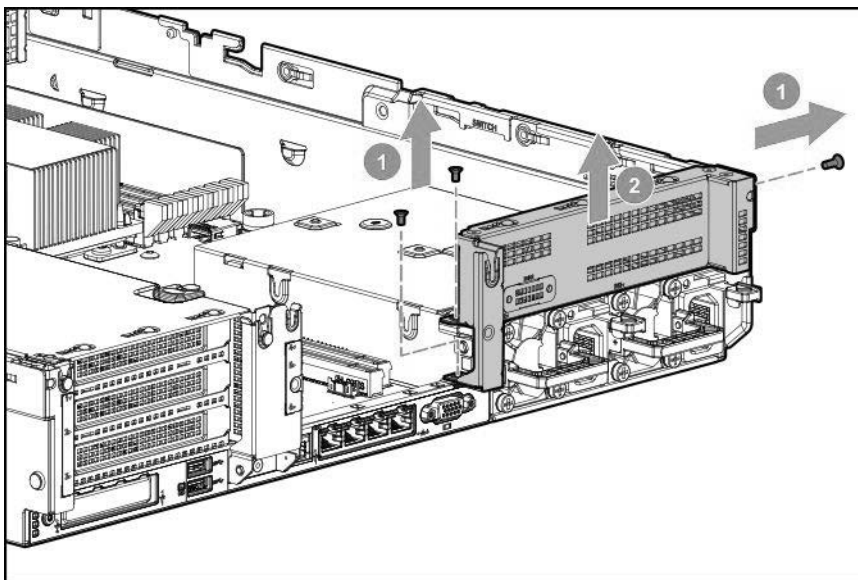
### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.

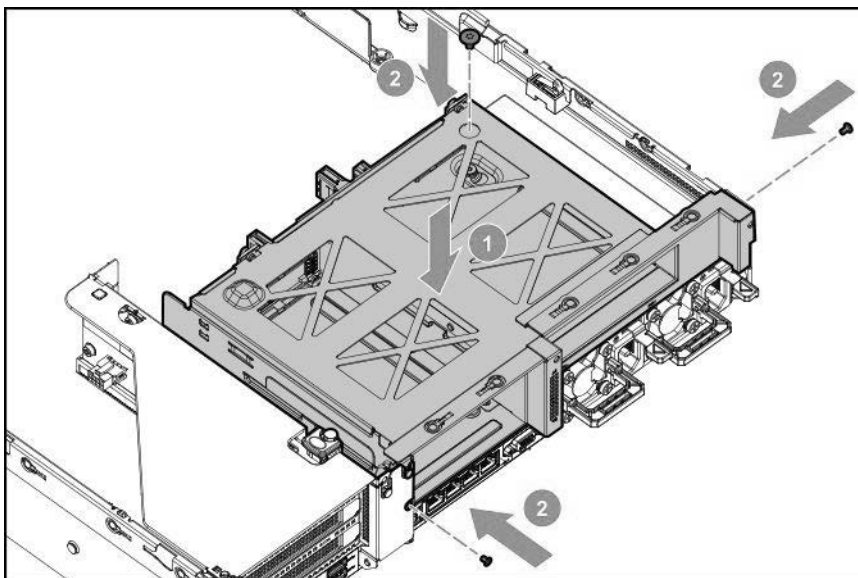
3. Do one of the following:
  - Extend the server from the rack.
  - Remove the server from the rack.
4. Remove the access panel.
5. If installed, remove the secondary riser cage. The secondary riser cage is not supported with a three-bay LFF rear configuration.



6. Remove the rear wall blank.



7. Install the three-bay LFF rear drive cage option.



8. Install drives or drive blanks.
9. **Connect the power and data cables.**
10. **Install the access panel.**
11. Slide the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server.** The installation is complete.

## Riser and riser cage options

### Installing primary and secondary risers

#### Prerequisites

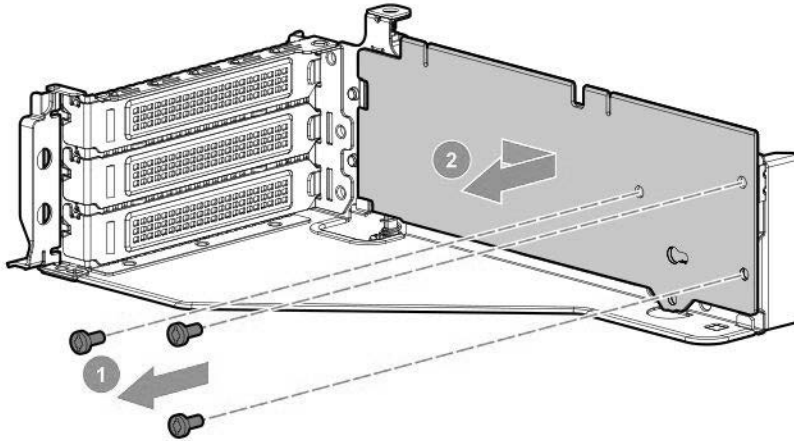
Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

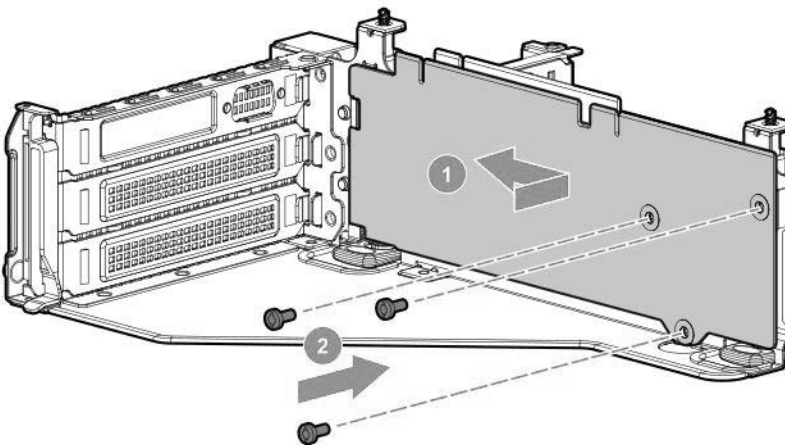
#### Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:

- **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
  5. **Remove the riser cage.**
  6. Remove the riser board.



7. Install the riser.



8. **If needed, install an expansion board.**
9. If needed, connect data cables to the riser or expansion board.
10. **Install the riser cage.**
11. If needed, connect data cables to the drive

backplane. The installation is complete.

# Installing tertiary risers

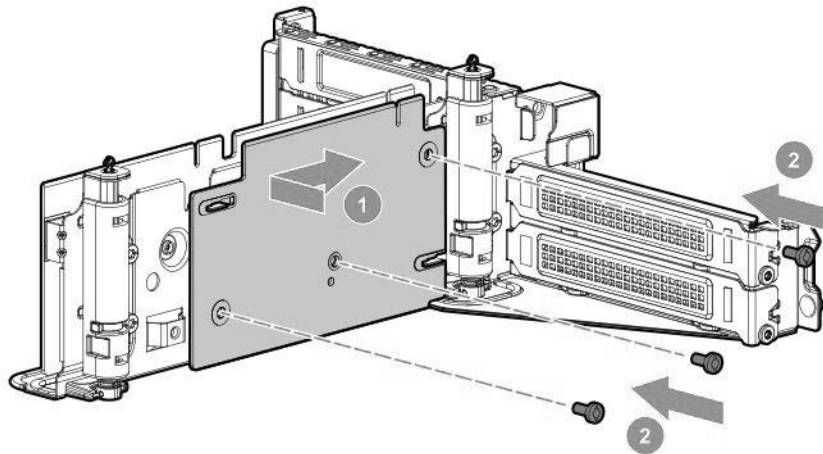
## Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver
- A tertiary riser cage is required to install this option.

## Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the riser cage.**
6. Install the riser.



7. **If needed, install an expansion board.**
8. If needed, connect data cables to the riser or expansion board.
9. **Install the tertiary riser cage.**
10. If needed, connect cables to drive backplane. The installation is complete.

## Installing a secondary riser cage

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

1. Observe the following alert:

---

**⚠ CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

---

2. **Power down the server.**

3. Remove all power:

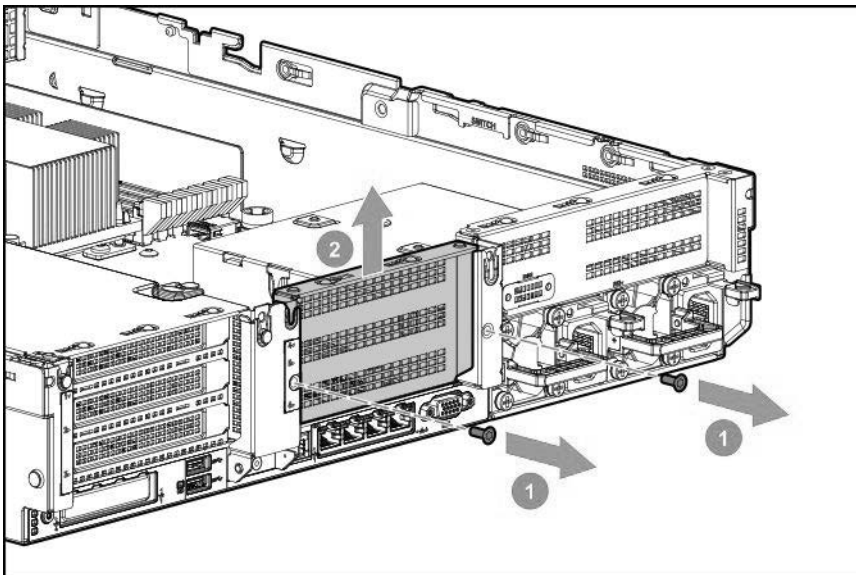
- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.

4. Do one of the following:

- **Extend the server from the rack.**
- **Remove the server from the rack.**

5. **Remove the access panel.**

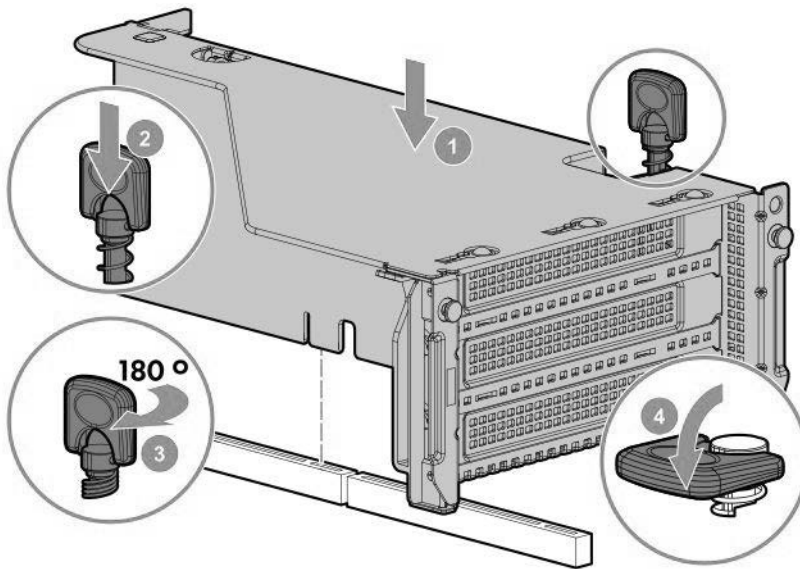
6. Remove the rear wall blank.



7. Install any expansion boards, if needed.

8. Install the riser cage:





The installation is complete.

## Installing a tertiary riser cage

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

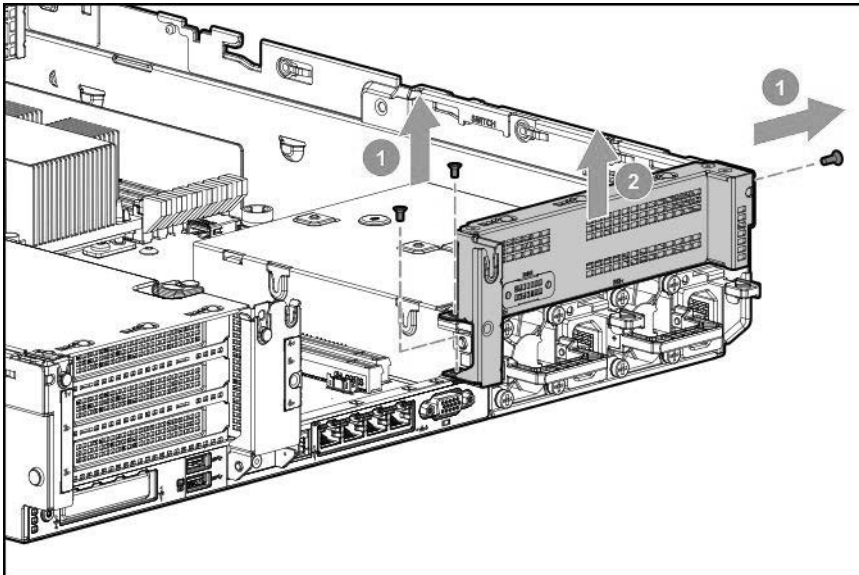
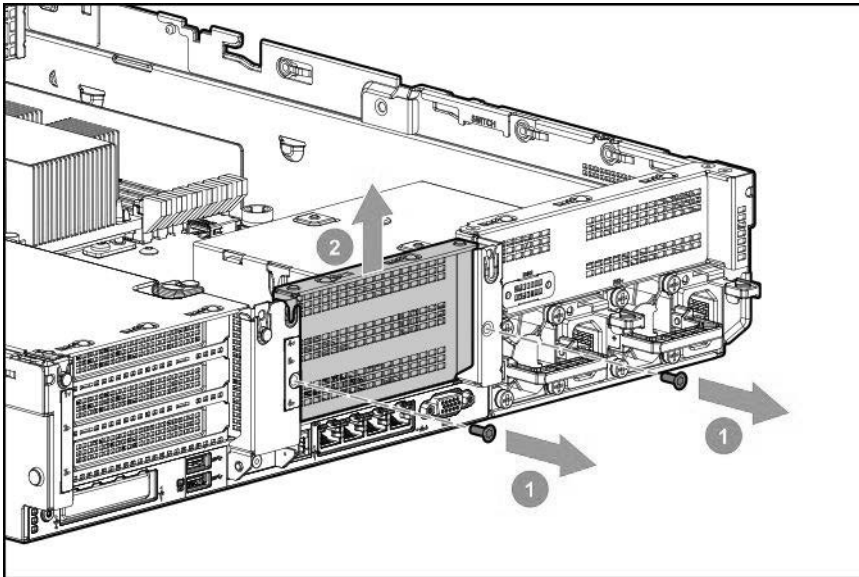
### Procedure

1. Observe the following alert.

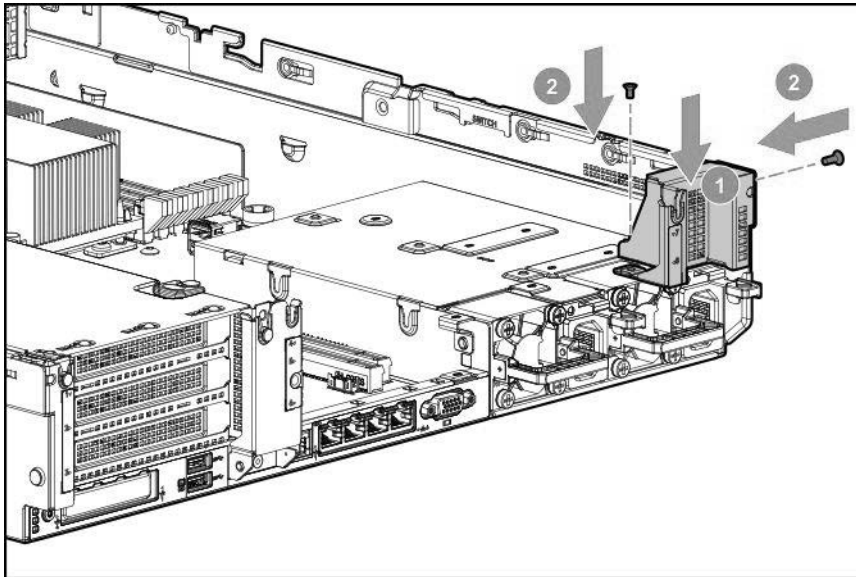


**CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

2. **Power down the server.**
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
5. **Remove the access panel.**
6. Remove the rear wall blanks.

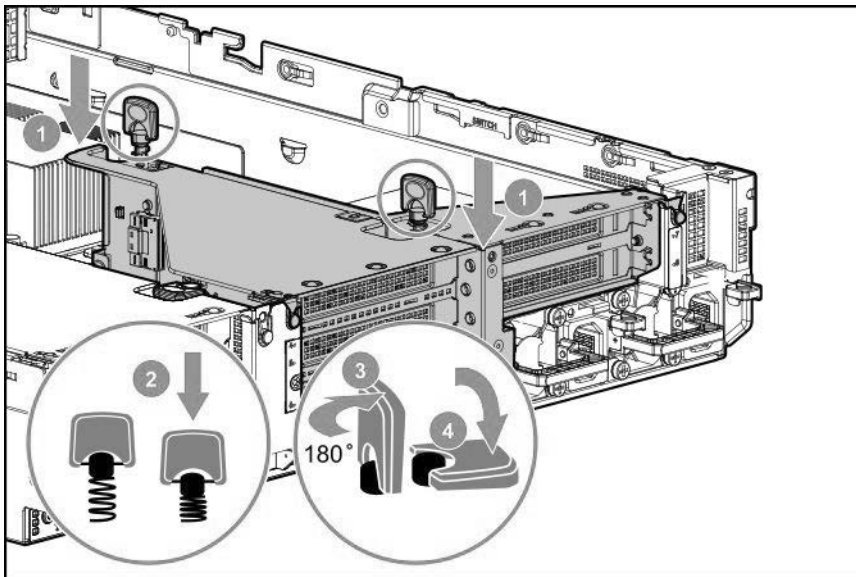


7. Install the rear blank from the option kit.



8. Install any expansion boards, if needed

9. Install the tertiary riser cage:



The installation is complete.

## Installing the 2NVMe slimSAS riser option

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

## Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Using the labels on the cable, connect the cables to the riser.**
6. **Install the tertiary riser cage.**
7. Connect the cable to the drive

backplane. The installation is complete.

## Installing the 8NVMe slimSAS riser option

The 8NVMe slimSAS riser can be installed in the primary or secondary position.

### Prerequisites

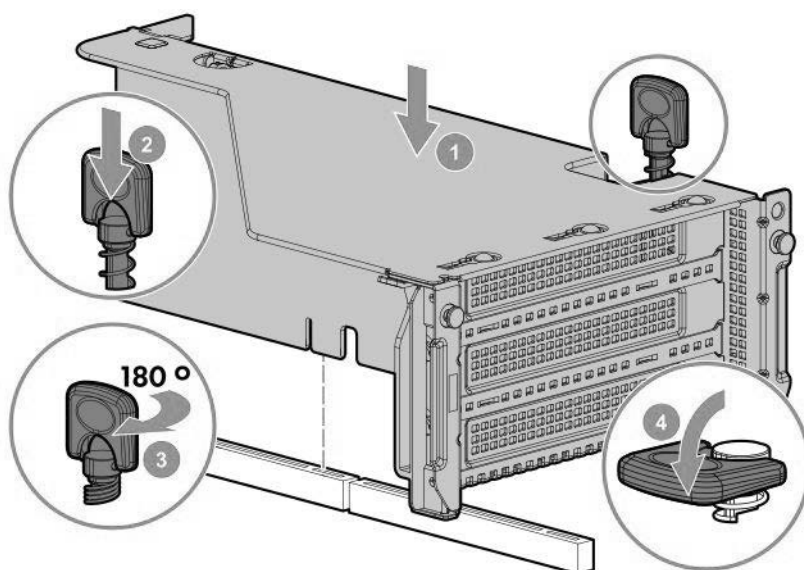
Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

## Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Using the labels on the cable, connect the cables to the riser.**
6. Do one of the following:

To install the riser in the primary position:



To install the riser in the secondary position, install the secondary riser cage.

7. Connect data cables to the drive backplane.

## Expansion slots

### Supported PCIe form factors

All slots support full-height expansion cards. Use the following information to find supported lengths for each slot.

#### Slot description example

Slot description example	
Slot 2 PCIe3 x16 (4,2,1)	
Slot number	
Gen3 signaling rate	
Physical connector link width	
Negotiable link width(s)	

**Primary riser connector**

PCIe slot and card length	3-slot riser*	2-slot riser (Optional)	2-slot riser (Optional)
Slot 1 - Full-length/Full- height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)	—	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 2 - Full-length/Full- height (FL/FH)	PCIe3 x16 (16, 8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 3 - Half-length/Full- height (HL/FH)	PCIe3 x8 (8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)	—

\*The server ships with one PCIe3 riser cage installed in the primary riser cage connector.

**Secondary riser connector**

PCIe slot and card length	3-slot riser*	2-slot riser (Optional)	2-slot riser (Optional)
Slot 4 - Full-length/Full- height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)	—	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 5 - Full-length/Full- height (FL/FH)	PCIe3 x16 (16, 8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 6 - Half-length/Full- height (HL/FH)	PCIe3 x8 (8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)	—

---

### Tertiary riser connector

PCIe slot and card length	2-slot riser (Optional)	1-slot riser (Optional)
Slot 7 - Full-length/Full-height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 8 - Half-length/Full-height (HL/FH)	PCIe3 x8 (8, 4, 2, 1)	—

---

## Installing expansion boards



**WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.



**CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

To install the component:

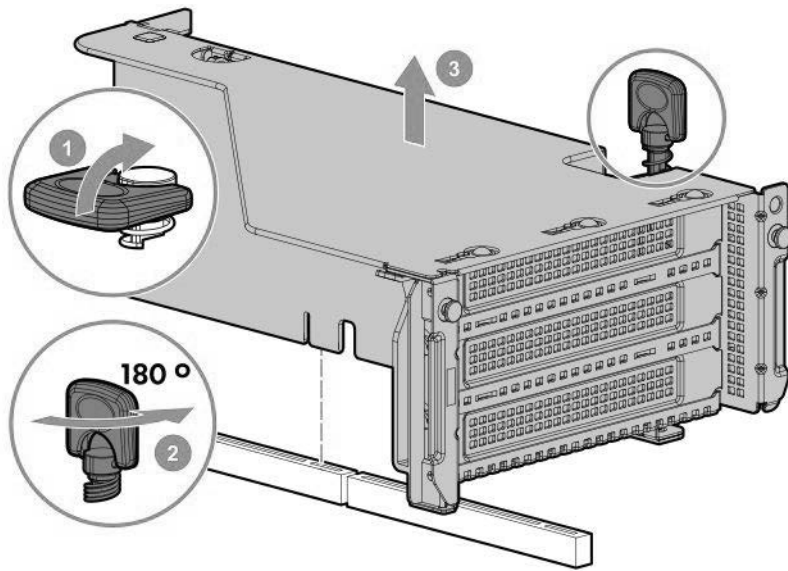
### Prerequisites

Use these instructions to install expansion boards such as Smart I/O cards (DSC-25 2-port SFP28 card), solid state NVMe/PCIe Add-In-Cards, HBAs, CNAs, InfiniBand adapters, and accelerators.

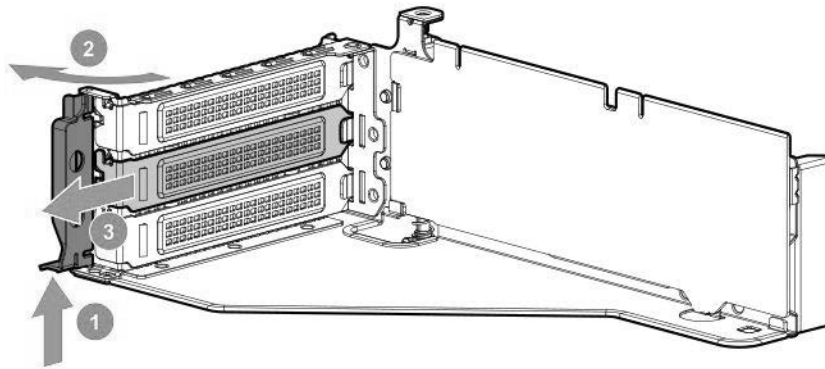
Before you perform this procedure, make sure that you have the following items available: The components included with the hardware option kit

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Remove the riser cage.

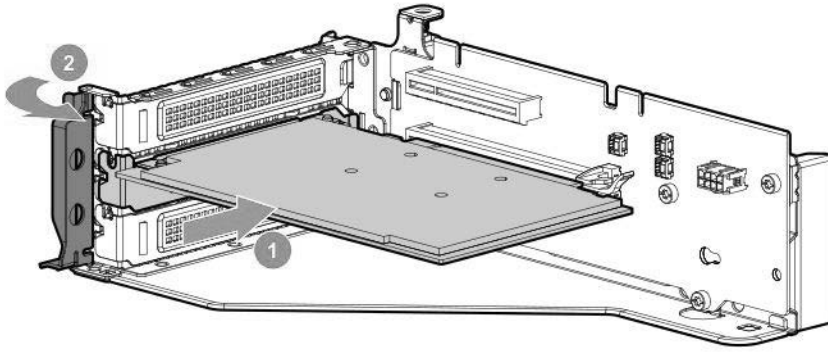


6. Identify and then remove the PCIe blank from the riser cage.

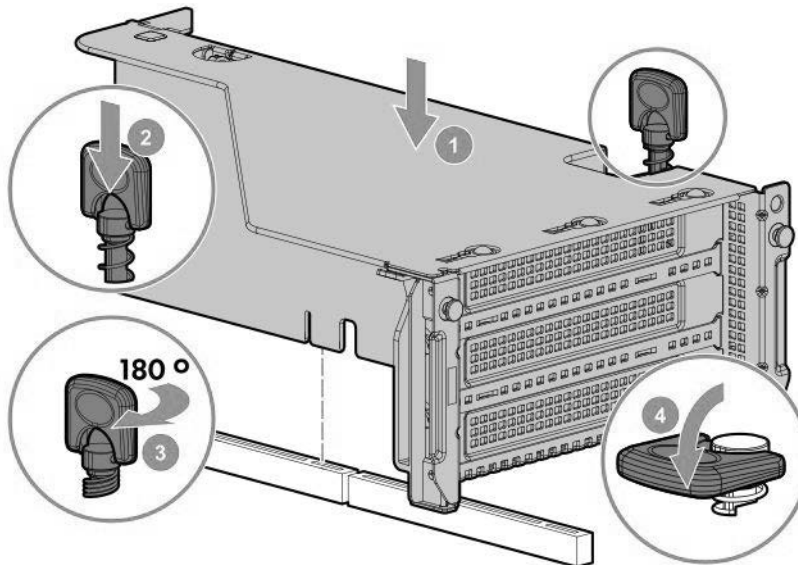


7. Install the expansion board.





8. If internal cables are required for the expansion board, connect the cables.
9. Install the riser cage.



10. **Install the access panel.**
11. Slide the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server.**

The installation is complete.

## Installing a 12G SAS Expander Card

- For 24SFF configurations, install 8SFF front drive cages in boxes 1 and 2.
- For configurations including a 2SFF rear drive cage, install the drive cage over the power supplies.
- Hitachi Vantara recommends installing the SAS expander card into slot 3 of the primary PCIe riser expansion card.

- To ensure that cables are connected correctly, observe the labels on the cable and port.
- Be sure that you have the latest firmware for the controllers and the expander card. To download the latest firmware, see <https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>.

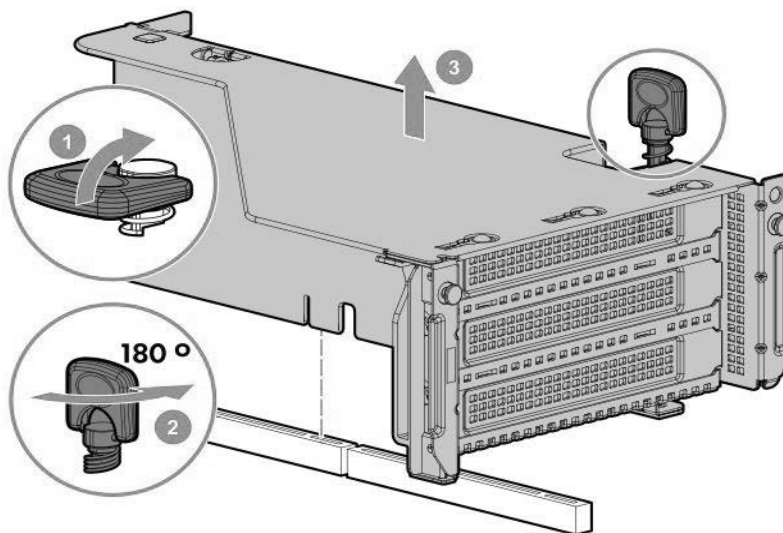
### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- Storage cables for each drive box
- A storage controller

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the riser cage.



8. Locate slot 3, and then **remove the expansion slot blank.**

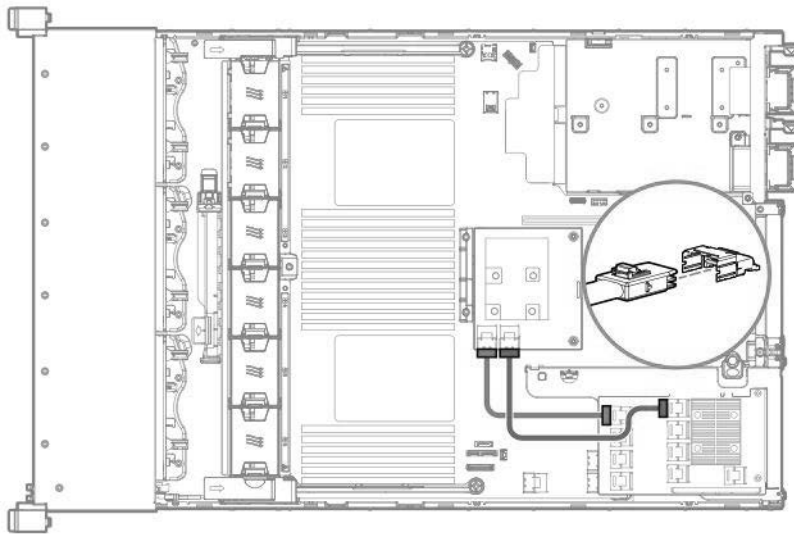
9. **Install the 12G SAS expander card.**

- ❗ **IMPORTANT:** The 12G SAS expander card requires a controller. The server supports embedded, type-a, and type-p smart array controllers. If using a type-p smart array controller, then install the controller in slot 1.

10. Using the labels on each cable, connect the cables to the SAS expander. For drive numbering, see "**Drive bay numbering: SAS expander**".

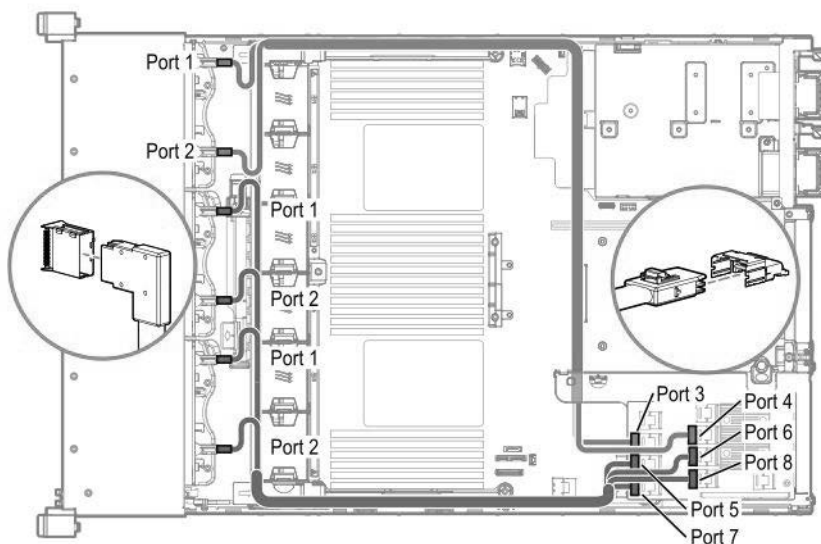
11. **Install the riser cage.**

12. **Connect cables from the 12G SAS expander to the controller.**



13. **Connect cables from the 12G SAS expander to the drive backplanes.**

A standard configuration is shown. For additional cabling diagrams, see **Cabling diagrams**.



14. **Install the fan cage.**

15. **Install the air baffle.**

16. **Install the access panel.**
17. Install the server into the rack.
18. Connect each power cord to the server.
19. Connect each power cord to the power source.
20. **Power up the server.** The installation is complete

## Installing an accelerator or GPU

An accelerator or GPU can be installed into the primary, secondary, or tertiary position. This procedure shows an installation in the secondary position.

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-30 Torx screwdriver
- T-10 Torx screwdriver
- High-performance heatsinks must be installed with this option.

### Procedure

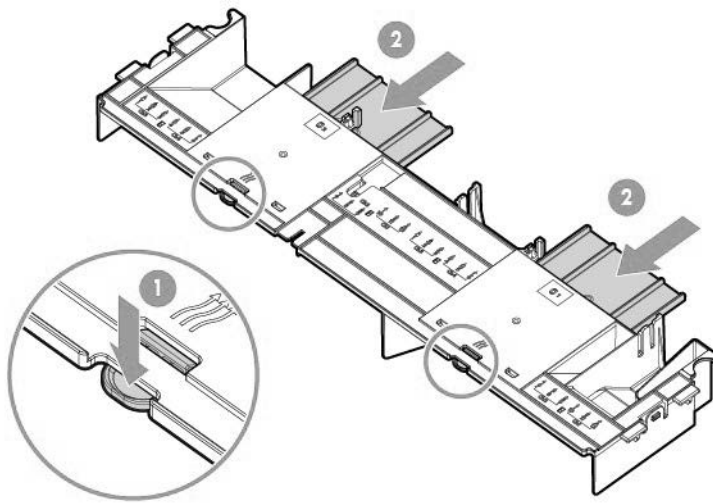
1. Observe the following alert.



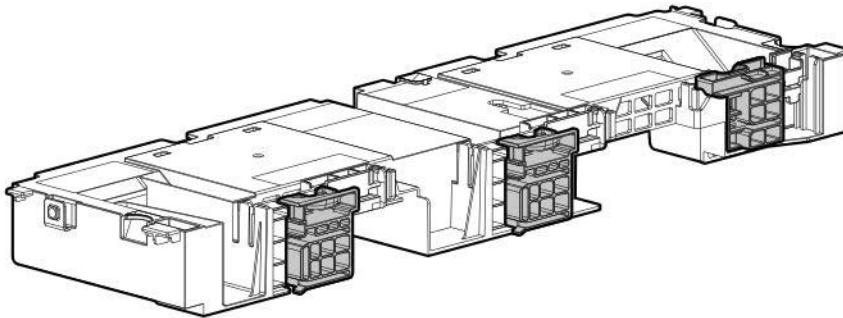
**CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all PCIe slots have either an expansion slot cover or an expansion board installed.

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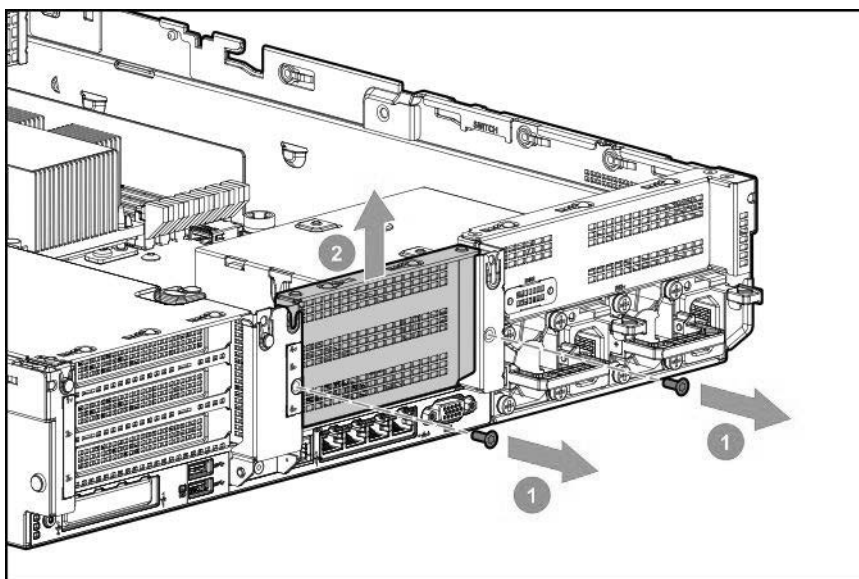
2. **Power down the server.**
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:
  - **Extending the server from the rack.**
  - **Removing the server from the rack.**
5. **Remove the access panel.**
6. **Removing the air baffle or midplane drive cage.**
7. For full-length cards that require support, install retention clips:
  - a. Remove the air diverters from the air baffle.



- b. Install the appropriate retention clip onto the air baffle.  
Install the clip that supports your configuration. Primary, secondary, and tertiary positions are shown.



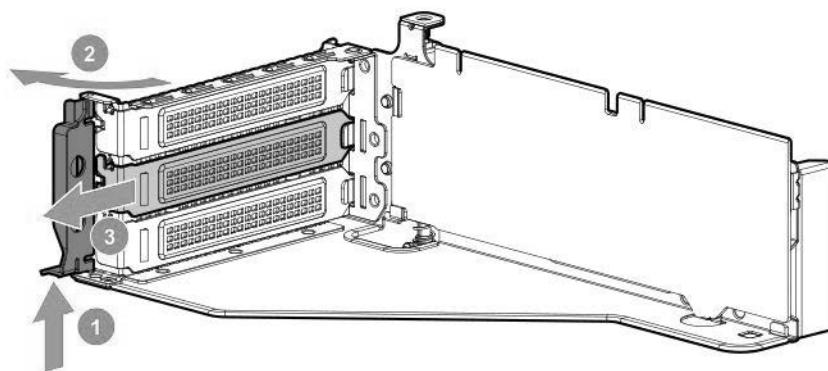
8. **Install high-performance heatsinks.**
9. **Install the air baffle.**
10. Remove the rear wall blank.  
The secondary rear wall blank is shown.



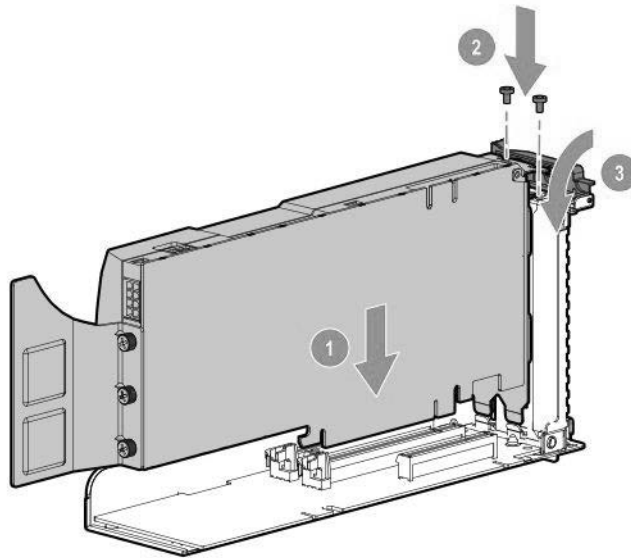
To install a card in the primary riser cage, see "[Removing a riser cage](#)".

To install a card in the tertiary riser cage, see "[Installing a tertiary riser cage](#)".

11. Remove the PCIe blank.

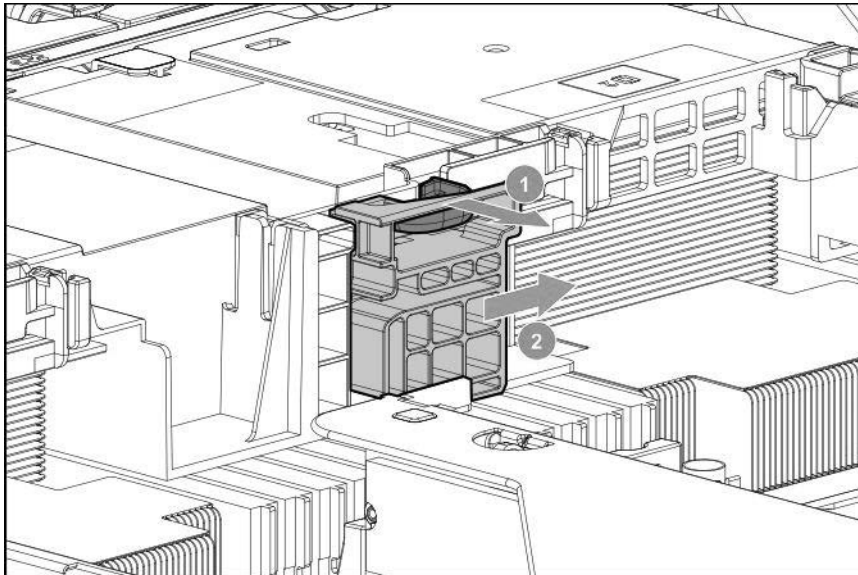


12. Install the card into the riser.

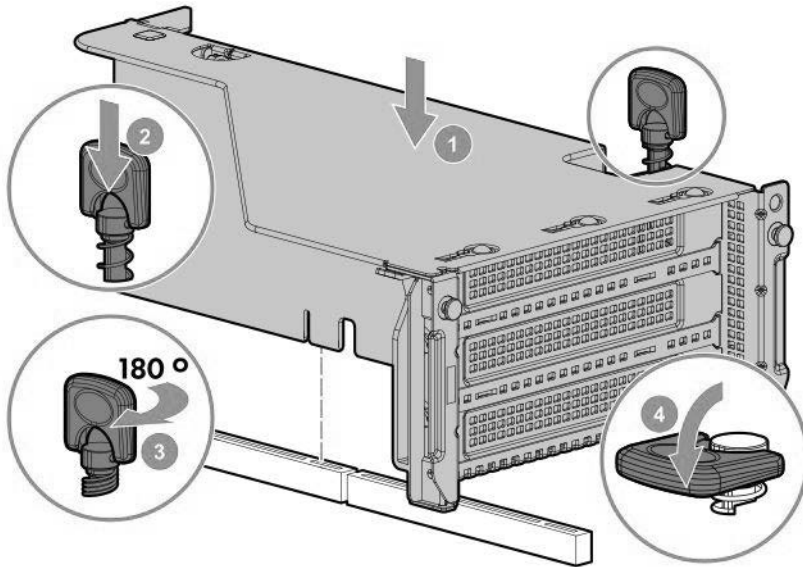


**13.** If required, connect the power cable from the card to the riser.

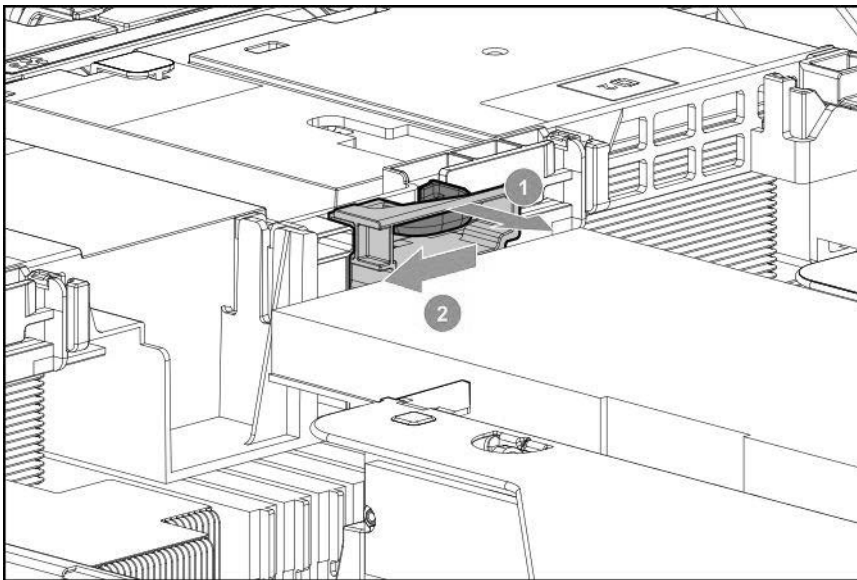
**14.** For full-length cards, open the retention clips.



**15.** Install the riser cage.



16. For full-length cards, slide the retention clips to the locked position.



The installation is complete.

## Installing the chassis intrusion detection switch

### Prerequisites

Before you perform this procedure, make sure that you have the following items

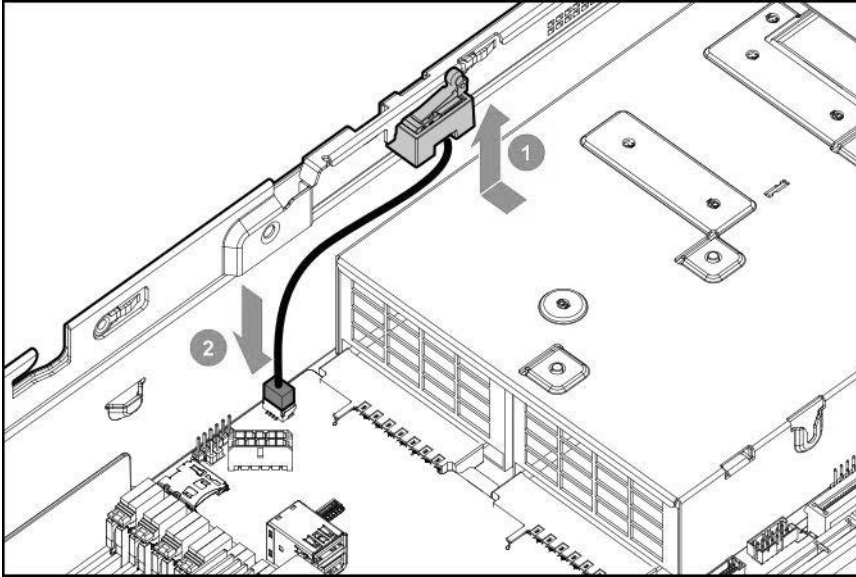
available: The components included with the hardware option kit

### Procedure

1. **Power down the server.**
2. Remove all power:



- a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Install the chassis intrusion detection switch.



6. **Install the access panel.**
7. **Install the server into the rack.**
8. Connect each power cord to the server.
9. Connect each power cord to the power source.
10. **Power up the server.** The installation is complete.

## Installing a rear serial port interface

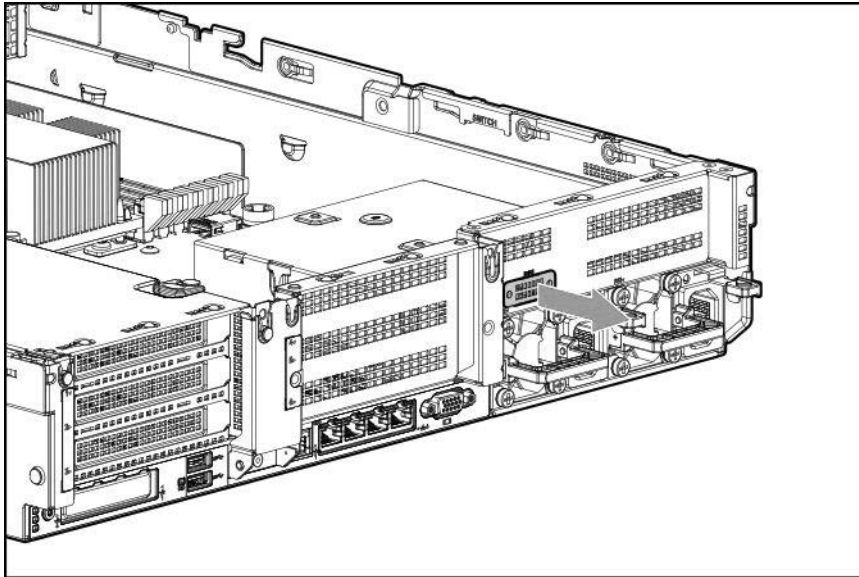
If a tertiary riser cage is installed, you can install the serial port into slot 6.

### Prerequisites

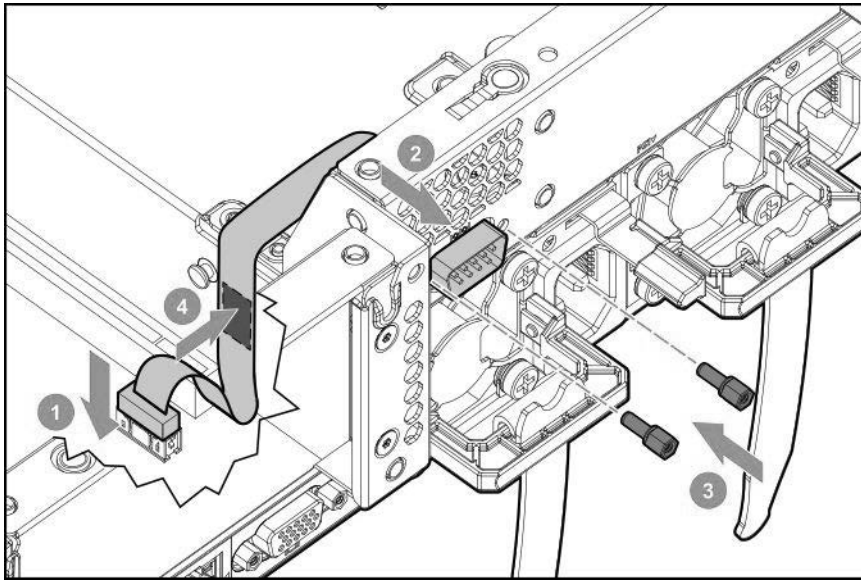
Before you perform this procedure, make sure that you have the following items available: The components included with the hardware option kit

## Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. If a tertiary riser cage is not installed, perform the following steps:
  - a. Remove the serial port blank.

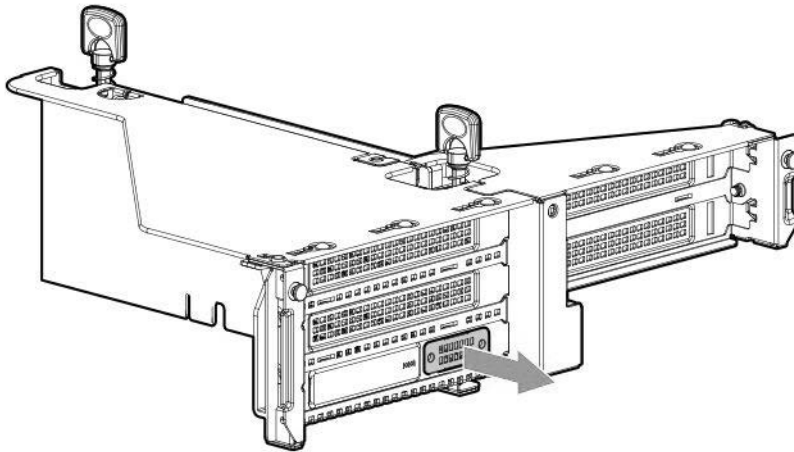


- b. Insert the serial cable through the blank port and connect it to the system board.
- c. Insert the serial port connector and fasten it to slot 6.
- d. Route the cable around the riser cage screws.
- e. Remove the double-sided backing and secure the cable to the side of the power supply cage.

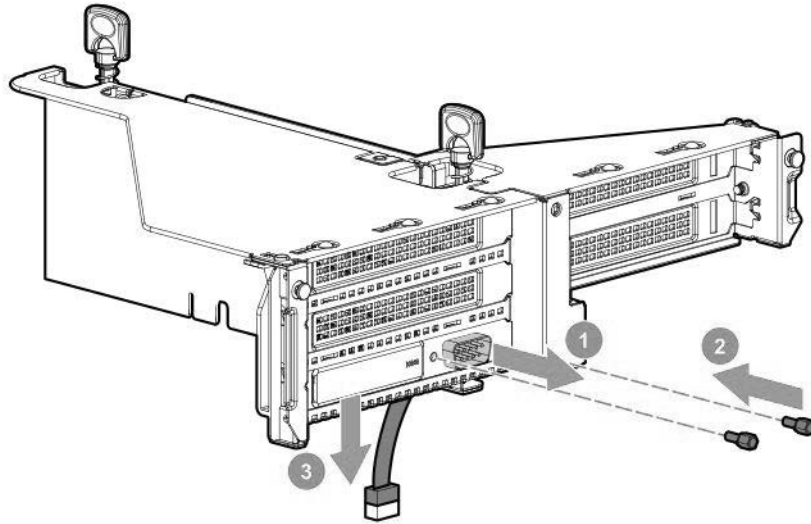


6. If a tertiary riser cage is installed, perform the following steps:

a. Remove the riser and the blank.



b. Install the serial port.



7. **Install the access panel.**
8. Install the server in the rack.
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. **Power up the server.**

The installation is complete.

## Installing the Systems Insight Display

### Prerequisites

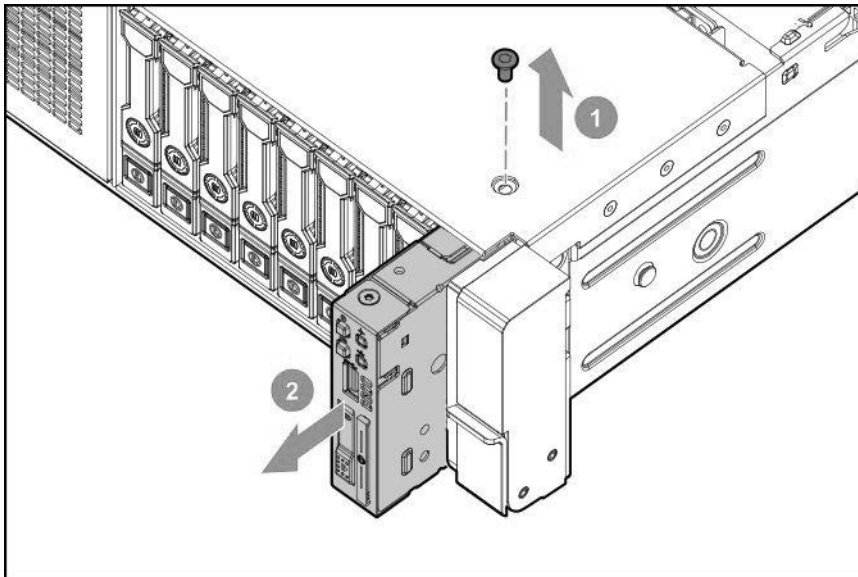
Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:

- Extend the server from the rack.
  - Remove the server from the rack.
4. Remove the access panel.
  5. Do one of the following:
    - Remove the air baffle.
    - If installed, remove the 4LFF midplane drive cage.
  6. Remove the fan cage.
  7. Disconnect the power switch module cable from the power switch/SID module connector. The SID module cable will be connected to this same connector.
  8. Remove the power switch module. Retain the T-10 screw for later use.

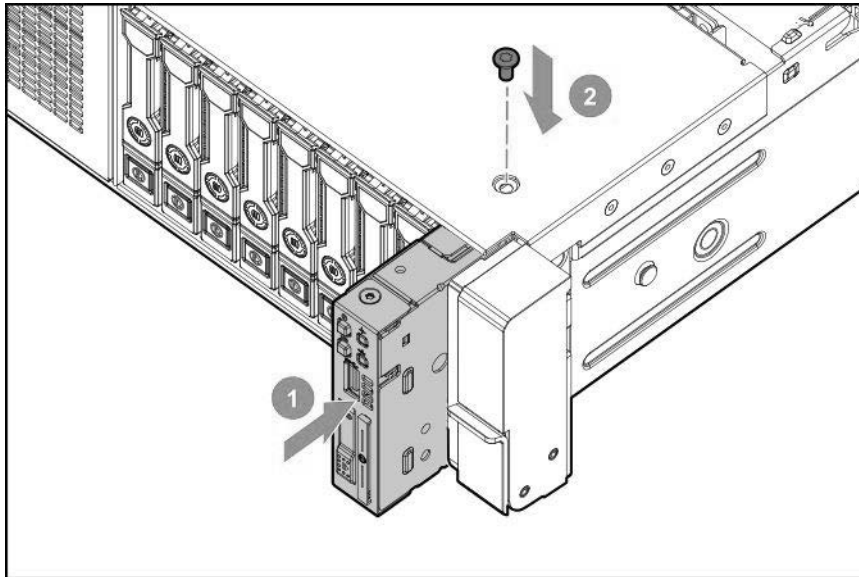


---

**⚠ CAUTION:** When routing cables, make sure that the cables are not in a position where they can be pinched or crimped.

---

9. Route the SID cable through the opening in the front of the server, and then install the SID module. Secure the module using the T-10 screw removed in step 8.



10. Connect the SID module cable to the power switch/SID module connector.
11. **Install the fan cage.**
12. Do one of the following:
  - **Install the air baffle.**
  - Perform steps 9–13 of “**Installing a midplane 4LFF SAS/SATA drive cage**”.
13. **Install the access panel.**
14. Slide the server into the rack.
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. **Power up the server.**
18. The installation is complete.

## Installing a FlexibleLOM adapter

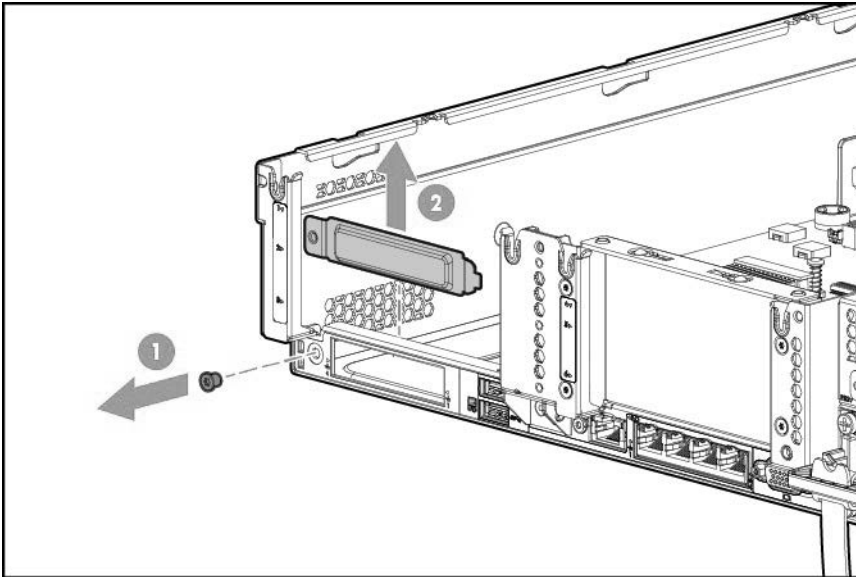
### Prerequisites

- The components included with the hardware option kit
- A T-10 Torx screwdriver might be needed to unlock the access panel.

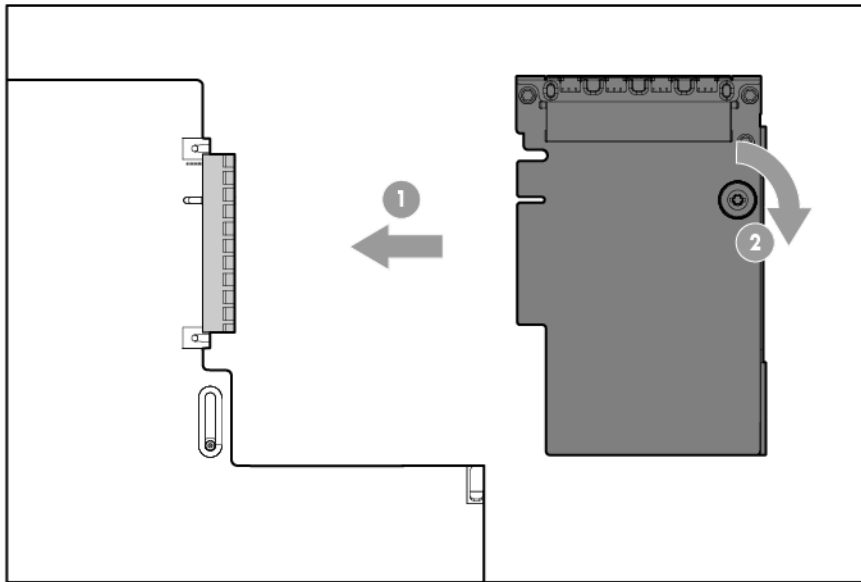
### Procedure

1. **Power down the server.**
2. Do one of the following:

- Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
- Extend the server from the rack.
  - Remove the server from the rack.
4. Remove the access panel.
5. Remove the primary riser cage.
6. Remove the FlexibleLOM blank.



7. Install the FlexibleLOM adapter.



8. Install the riser cage.
9. **Install the access panel.**
10. **Install the server into the rack.**
11. Connect the LAN segment cables.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server.**

The installation is complete.

## Installing a 1U or high performance heatsink

This procedure shows a standard heatsink as an example. The installation process is the same for all heatsinks.

Hitachi Vantara recommends identifying the **processor, heatsink, and socket components** before performing this procedure.

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-30 Torx screwdriver
- Thermal grease



- Alcohol wipe
- 1/4-inch flathead screwdriver

## Procedure

1. Observe the following alerts.



**CAUTION:** To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.



**CAUTION:** If installing a processor with a faster speed, update the system ROM before installing the processor.

To download firmware and view installation instructions, see

<https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>.



**CAUTION: THE CONTACTS ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the socket or processor, do not touch the contacts.

2. **Power down the server.**

3. Remove all power:

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.

4. Do one of the following:

- **Extend the server from the rack.**
- **Remove the server from the rack.**

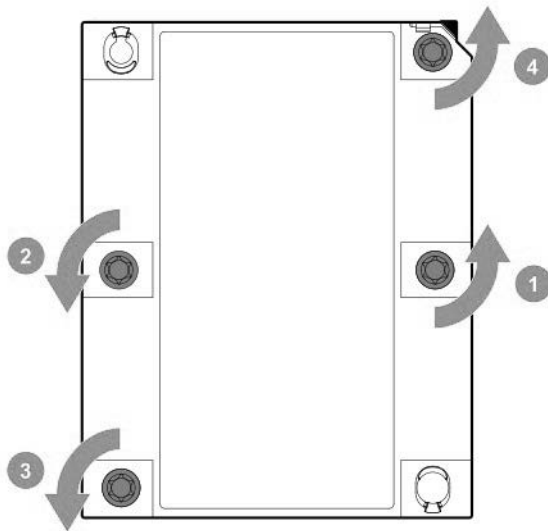
5. **Remove the access panel.**

6. Do one of the following:

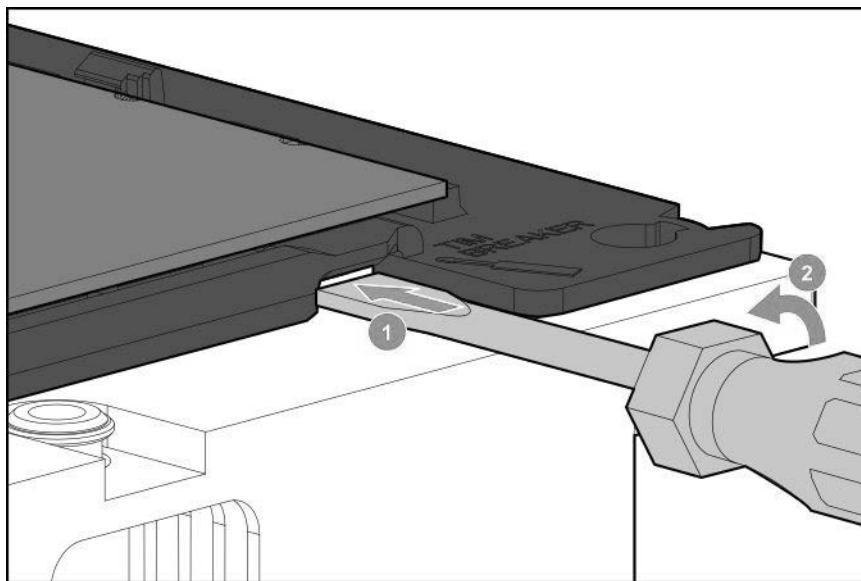
- **Remove the air baffle.**
- **If installed, remove the 4LFF midplane drive cage.**

7. Remove the processor heatsink assembly:

- a. Allow the heatsink to cool.
- b. Loosen the heatsink nuts in the order specified by the label on the heatsink.

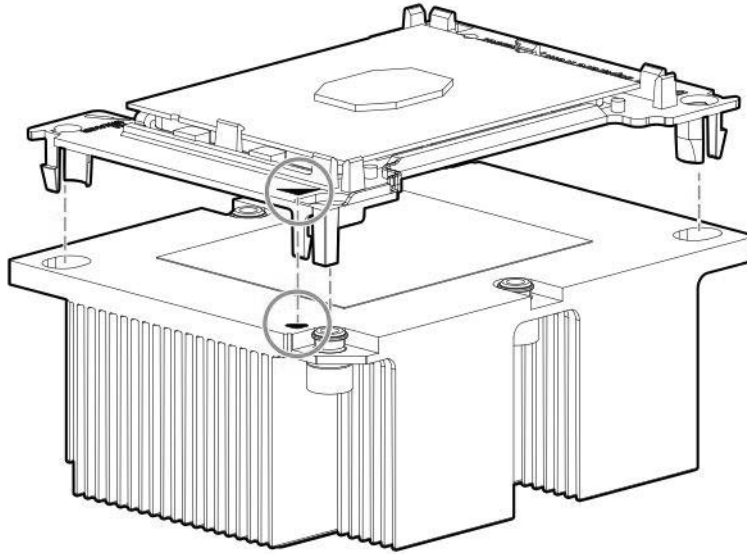


- c. Lift the processor heatsink assembly and move it away from the system board.
  - d. Turn the assembly over and place it on a work surface with the processor facing up.
  - e. Install the dust cover.
8. Separate the processor from the heatsink:
- a. Locate the release slot between the frame and heatsink.  
The release slot is across from the Pin 1 indicator and is labeled with a screwdriver.
  - b. Insert a 1/4" flathead screwdriver into the release slot.  
Be sure that the screwdriver is between the plastic frame and the heatsink.
  - c. To lift the processor frame away from the heatsink, slowly rotate the screwdriver.



- d. Unlatch the remaining corners of the frame.
- e. Separate the frame from the heatsink.

9. Using an alcohol wipe, remove the existing thermal grease. Allow solvent to dry before making contact with thermal grease.
10. Align the latches and pin 1 indicator, and then install the frame to the heatsink. Verify that all of the latches are engaged with the heatsink.



11. **Install the processor heatsink assembly.** The installation is complete.

## Installing a processor

Observe the following:

- Before performing this procedure, identify the **processor, heatsink, and socket components**.
- Intelligent System Tuning supports specific processors and configurations.



**IMPORTANT:** Existing Hitachi Advanced Server and HA800 server products containing first-generation Intel Xeon Scalable processors may not be upgraded to second-generation Intel Xeon Scalable processors at this time.

### Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-30 Torx screwdriver

### Procedure

1. Observe the following alerts.



**CAUTION:** When handling the heatsink, always hold it along the top and bottom of the fins. Holding it from the sides can damage the fins.

- ⚠ CAUTION:** To avoid damage to the processor or system board, only authorized personnel should attempt to replace or install the processor in this server.
- 
- ⚠ CAUTION:** To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.
- 
- ⚠ CAUTION:** If installing a processor with a faster speed, update the system ROM before installing the processor. To download firmware and view installation instructions, see <https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>.
- 
- ⚠ CAUTION: THE CONTACTS ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the socket or processor, do not touch the contacts.
- 

**2. Power down the server.**

**3. Remove all power:**

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.

**4. Do one of the following:**

- **Extend the server from the rack.**
- **Remove the server from the rack.**

**5. Remove the access panel.**

**6. Do one of the following:**

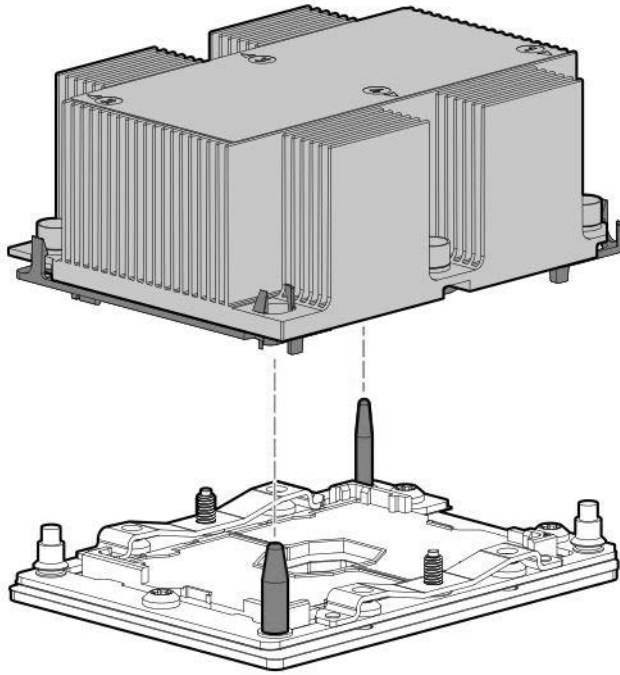
- **Remove the air baffle.**
- **If installed, remove the 4LFF midplane drive cage.**

**7. Install the processor heatsink assembly:**

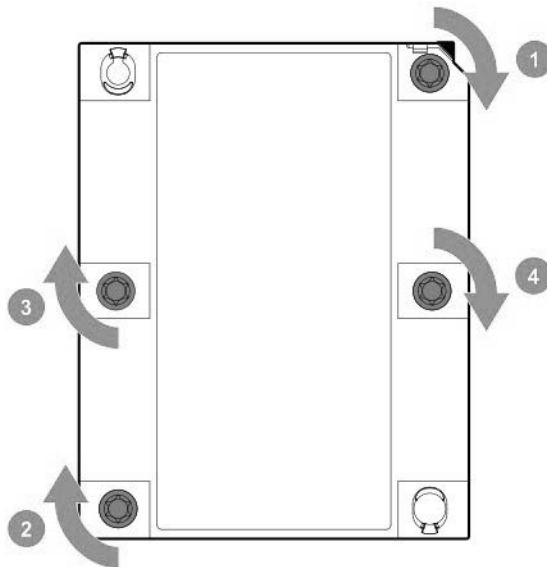
- a. Remove the dust cover.
- b. Locate the Pin 1 indicator on the processor frame and the socket.
- c. Align the processor heatsink assembly with the alignment posts and gently lower it down until it sits evenly on the socket.

The heatsink alignment posts are keyed. The processor will only install one

way. A standard heatsink is shown. Your heatsink might look different.



- d. Using a T-30 Torx screwdriver, tighten the nuts until they stop.



The installation is complete.

## Trusted Platform Module 2.0 option

### Overview

Use these instructions to install and enable an TPM 2.0 Kit in a supported server.

This procedure includes three sections:

1. Installing the Trusted Platform Module board.
2. Enabling the Trusted Platform Module.
3. Retaining the recovery key/password.

TPM 2.0 installation is supported with specific operating system support such as Microsoft Windows Server 2012 R2 and later. For more information about Microsoft Windows BitLocker Drive Encryption feature, see the Microsoft website (<https://www.microsoft.com>).

---

**⚠ CAUTION:** If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.

---

**❗ IMPORTANT:** In UEFI Boot Mode, the TPM 2.0 Kit can be configured to operate as TPM 2.0 (default) or TPM 1.2 on a supported server. In Legacy Boot Mode, the configuration can be changed between TPM 1.2 and TPM 2.0, but only TPM 1.2 operation is supported.

---

## Trusted Platform Module 2.0 Guidelines

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**⚠ CAUTION:** Always observe the guidelines in this document. Failure to follow these guidelines can cause hardware damage or halt data access.

---

When installing or replacing a TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM is bound to the system board. If an OS is configured to use the TPM and it is removed, the OS may go into recovery mode, data loss can occur, or both.
- When installing or replacing hardware, Hitachi Vantara service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.
- When returning a system board for service replacement, do not remove the TPM from the system board. When requested, Hitachi Vantara Service provides a TPM with the spare system board.
- Any attempt to remove the cover of an installed TPM from the system board can damage the TPM cover, the TPM, and the system board.
- If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.
- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to complete Recovery Mode after BitLocker detects a possible compromise of system integrity or system configuration.
- Hitachi Vantara is not liable for blocked data access caused by improper TPM use. For operating instructions, see the TPM documentation or the encryption technology feature documentation provided by the operating system.

# Installing and enabling the TPM 2.0 option


## Installing the Trusted Platform Module board

### Preparing the server for installation


#### Procedure

1. Observe the following warnings:

---

 **WARNING:** The front panel Power On/Standby button does not shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.  
To reduce the risk of personal injury, electric shock, or damage to the equipment, remove power from the server: For rack and tower servers, remove the power cord.

---

 **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

---

2. Update the system ROM.

Locate and download the latest ROM version from

<https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>.

Follow the instructions on the website to update the system ROM.

3. Power down the server (**Power down the server**).

4. Remove all power:

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.

5. Do one of the following:

- Extend the server from the rack.
- Remove the server from the rack.

6. Place the server on a flat, level work surface.

7. Remove the access panel.

8. Do one of the following:

- **Remove the air baffle.**
- **If installed, remove the 4LFF midplane drive cage.**

9. Remove any components or cables that may prevent access to the TPM connector.

10. Proceed to **Installing the TPM board and cover.**

### Installing the TPM board and cover

#### Procedure

1. Observe the following alerts:

---

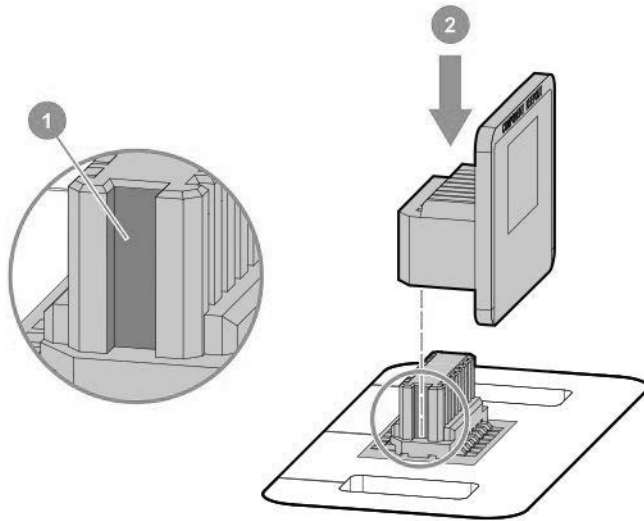
**⚠CAUTION:** If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.

---

**⚠CAUTION:** The TPM is keyed to install only in the orientation shown. Any attempt to install the TPM in a different orientation might result in damage to the TPM or system board.

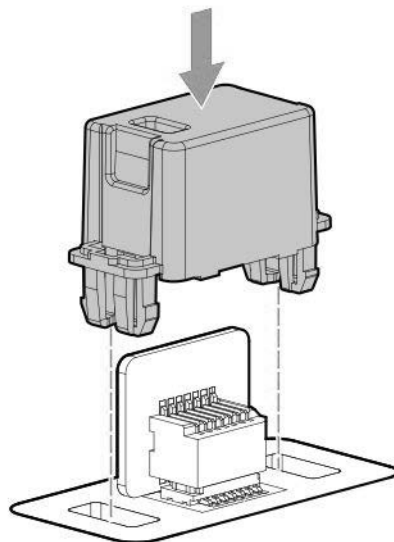
---

2. Align the TPM board with the key on the connector, and then install the TPM board. To seat the board, press the TPM board firmly into the connector. To locate the TPM connector on the system board, see the server label on the access panel.



3. Install the TPM cover:

- a. Line up the tabs on the cover with the openings on either side of the TPM connector.
- b. To snap the cover into place, firmly press straight down on the middle of the cover.





4. Proceed to **Preparing the server for operation.**

## Preparing the server for operation

### Procedure

1. Install any options or cables previously removed to access the TPM connector.
2. Do one of the following:
  - **Install the air baffle.**
  - **Install the 4LFF midplane drive cage.**
3. **Install the access panel.**
4. Install the server in the rack.
5. Connect power cords to the server.
6. Press the Power On/Standby button.

## Enabling the Trusted Platform Module

When enabling the Trusted Platform module, observe the following guidelines:

- By default, the Trusted Platform Module is enabled as TPM 2.0 when the server is powered on after installing it.
- In UEFI Boot Mode, the Trusted Platform Module can be configured to operate as TPM 2.0 (default) or TPM 1.2.
- In Legacy Boot Mode, the Trusted Platform Module configuration can be changed between TPM 1.2 and TPM 2.0 (default), but only TPM 1.2 operation is supported.

## Enabling the Trusted Platform Module as TPM 2.0

### Procedure

1. During the server startup sequence, press the **F9** key to access **System Utilities**.
2. From the System Utilities screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > Server Security > Trusted Platform Module options**.
3. Verify the following:
  - "Current TPM Type" is set to **TPM 2.0**.
  - "Current TPM State" is set to **Present and Enabled**.
  - "TPM Visibility" is set to **Visible**.
4. If changes were made in the previous step, press the **F10** key to save your selection.
5. If **F10** was pressed in the previous step, do one of the following:
  - If in graphical mode, click **Yes**.
  - If in text mode, press the **Y** key.

6. Press the **ESC** key to exit System Utilities.
7. If changes were made and saved, the server prompts for reboot request. Press the **Enter** key to confirm reboot.

If the following actions were performed, the server reboots a second time without user input. During this reboot, the TPM setting becomes effective.

- Changing from TPM 1.2 and TPM 2.0
  - Changing TPM bus from FIFO to CRB
  - Enabling or disabling TPM
  - Clearing the TPM
8. Enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot. For more information, see the [Microsoft website](#).

## Enabling the Trusted Platform Module as TPM 1.2

### Procedure

1. During the server startup sequence, press the **F9** key to access **System Utilities**.
2. From the System Utilities screen select **System Configuration > BIOS/Platform Configuration (RBSU) > Server Security > Trusted Platform Module options**.
3. Change the "TPM Mode Switch Operation" to **TPM 1.2**.
4. Verify that "TPM Visibility" is set to **Visible**.
5. Press the **F10** key to save your selection.
6. When prompted to save the change in System Utilities, do one of the following:
  - If in graphical mode, click **Yes**.
  - If in text mode, press the **Y** key.
7. Press the **ESC** key to exit System Utilities.

The server reboots a second time without user input. During this reboot, the TPM setting becomes effective.

8. Enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot. For more information, see the [Microsoft website](#).

## Retaining the BitLocker recovery key/password

The recovery key/password is generated during BitLocker setup, and can be saved and printed after BitLocker is enabled. When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.

To help ensure maximum security, observe the following guidelines when retaining the recovery key/password:

- Always store the recovery key/password in multiple locations.
- Always store copies of the recovery key/password away from the server.
- Do not save the recovery key/password on the encrypted hard drive.

# Cabling

## Hitachi Advanced Server Storage Cabling Guidelines

When installing cables, observe the following:

- All ports are labeled:
  - System board ports
  - Controller ports
  - 12G SAS Expander ports
- Most data cables have labels near each connector with destination port information.
- Some data cables are pre-bent. Do not unbend or manipulate the cables.
- Before connecting a cable to a port, lay the cable in place to verify the length of the cable.
- When routing cables from the front to the rear of the server, use the cable channels on either side of the chassis.

## Cabling diagrams

Use the following tables to find cabling information and diagrams.

**Table 3: SAS/SATA kits**

Option kit	Cable part number*	From	To	Power cable part number
Front 2SFF SAS/SATA drive cage (SFF)	<u>869826-001</u> <sup>1</sup>	Drive backplane	System board	869810-001 <sup>6</sup>
			SAS Expander	869825-001 <sup>6</sup>
			Controller	
Front 2SFF SAS/SATA 1U drive cage (LFF)	_____ <sup>1</sup>	Drive backplane	System board	869810-001 <sup>6</sup>
			SAS Expander	
			Controller	
Front 8SFF SAS/SATA drive cages board	<u>776402-001</u> <sup>4</sup>	Drive backplane	System	869825-001 <sup>6</sup>
			SAS Expander	
			Controller	

Option kit	Cable part number*	From	To	Power cable part number
Front 4LFF SAS/SATA drive cages board	869827-001 <sup>1</sup>	Drive backplane	System  SAS  Expander	869825-001 <sup>6</sup>
			Controller	869810-001 <sup>6</sup>
Mid 4LFF SAS/SATA drive cage	<u>869824-001</u> <sup>2</sup>	Drive backplane	System board  SAS  Expander	869806-001 <sup>6</sup>
			Controller	
Rear 2SFF SAS/SATA riser drive cage	<u>869823-001</u> <sup>3</sup>	Drive backplane	System board  SAS  Expander	869810-001 <sup>6</sup>
			Controller	
Rear 3LFF SAS/SATA drive cage	<u>869823-001</u> <sup>3</sup>	Drive backplane	System board  SAS Expander  Controller	
12G SAS Expander card	<u>869802-001</u> <sup>5</sup> 869803-001 5	SAS Expander	Controller	-
SAS/SATA 3-position cable	869830-001 3 869816-001 3	Drive backplane	System board	-

\* To order spare cables, use the following kits and spare part numbers.

<sup>1</sup> Mini SAS LFF Kit (875090-001)

<sup>2</sup> 12G SAS Expander Kit (875094-001)

<sup>3</sup> Mini SAS SFF Kit (875089-001)

<sup>4</sup> SAS 8SFF Kit (784629-001)

<sup>5</sup> 12G SAS Expander to controller kit (875093-001)

<sup>6</sup> Power cables kit (875096-001)

**Table 4: NVMe bay/riser kits**

Option kit	Cable part number	From	To	Power cable part number
Front 2SFF NVMe drive cage	NVMe cable included with NVMe riser	Drive backplane	Tertiary riser	869810-001 <sup>3</sup>
Front 8SFF SAS/SATA/NVMe Premium for SFF	776402-001 <u>NVMe cable</u> included with NVMe riser	Drive backplane	SATA to Systemboard , controller, or SAS expander  Tertiary riser	869825-001 <sup>3</sup>
Front 8SFF NVMe drive cage	NVMe cable included with NVMe riser	Drive backplane	Primary riser	869825-001 <sup>3</sup>
4-Port Slim SAS Riser, Secondary PCIe	869814-001 <sup>1</sup> 869813-001 <sup>1</sup>	PCIe riser	Backplane	-
2-Port Slim SAS Riser, Tertiary PCIe	869812-001 <sup>1</sup> 869812-001 <sup>1</sup>	PCIe riser	Backplane	-
4-Port Slim SAS Riser	869811-001	PCIe riser	Backplane	-

1-Port Slim SAS Riser	869812-001 <sup>1</sup>	PCIe riser	Backplane	-
-----------------------	-------------------------	------------	-----------	---

<sup>1</sup> NVMe Direct Attach Kit (875092-001)

<sup>2</sup> NVMe SFF Riser Kit (875091-001)

<sup>3</sup> Power cables kit (875096-001)

**Table 5: GPU power**

Option kit	Cable part number	From	To
GPU 6px6p Y-Power Cable Kit	873193-001 <sup>1</sup>	GPU	Riser
GPU 8px6p Y-Power Cable Kit	869805-001 <sup>1</sup>	GPU	Riser
GPU 8p Keyed GPU Cable Kit	869820-001 <sup>1</sup>	GPU	Riser
GPU 8p Cable Kit	869821-001 <sup>1</sup>	GPU	Riser
GPU power adapter	869828-001 <sup>1</sup>	GPU	System board

<sup>1</sup> GPU cables kit (875097-001)

**Table 6: Data kits**

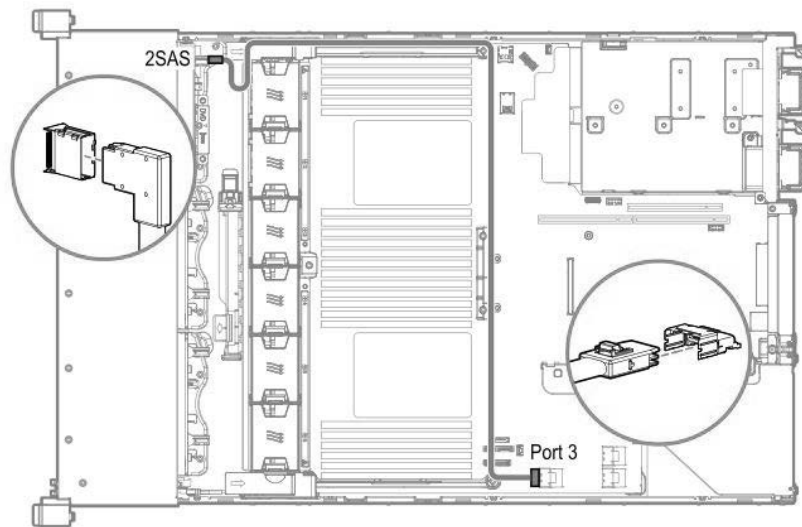
Option kit	Cable part number	From	To
Front USB/display port (SFF UMB)	869804-001 <sup>1</sup>	Component	System
board Front USB port (SFF UMB)	869829-001 <sup>1</sup>	Component	System
board Front display port (LFF)	869808-001 <sup>1</sup>	Component	System
board Optical disk drive	756914-001 <sup>2</sup>	Component	System
board			
<b>Systems Insight Display</b>	Included with component	Component	System board

<sup>1</sup> Data cables kit (875095-001)

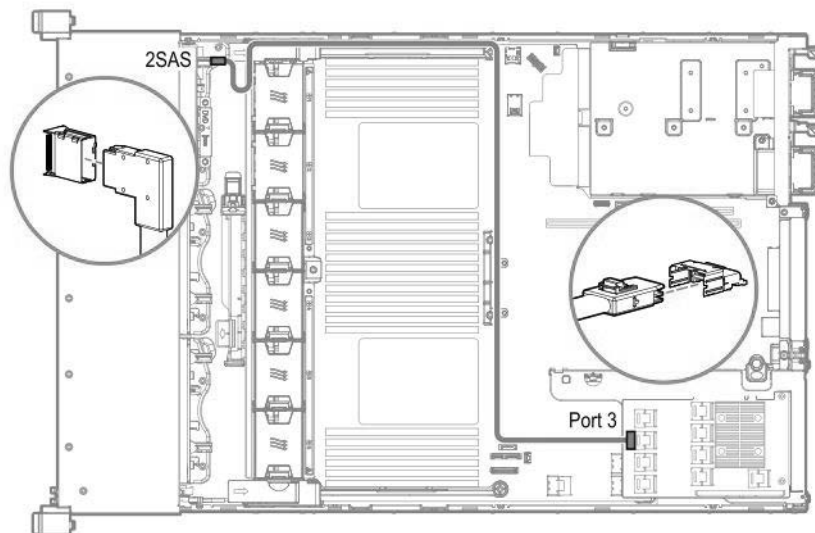
<sup>2</sup> DVD cable kit (784623-001)

## Cable routing: Front 2SFF drive option for SFF

### Option 1: System board



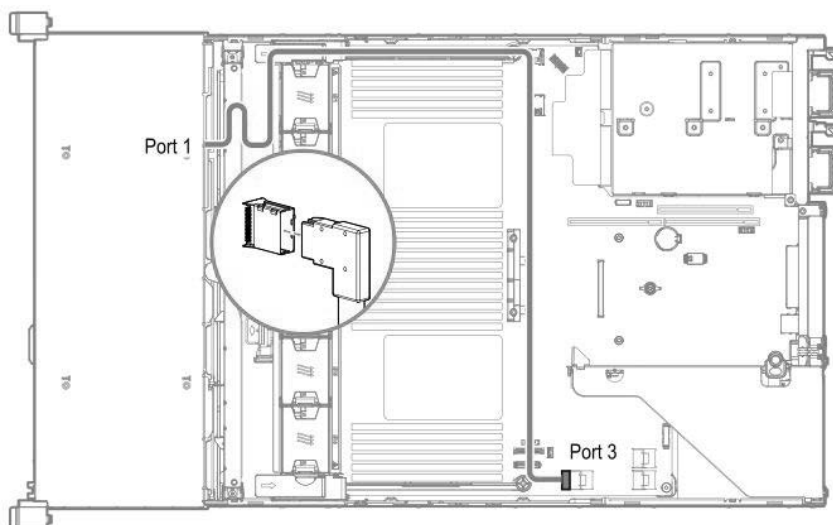
## Option 2: SAS Expander



## Option 3 (not shown): A controller

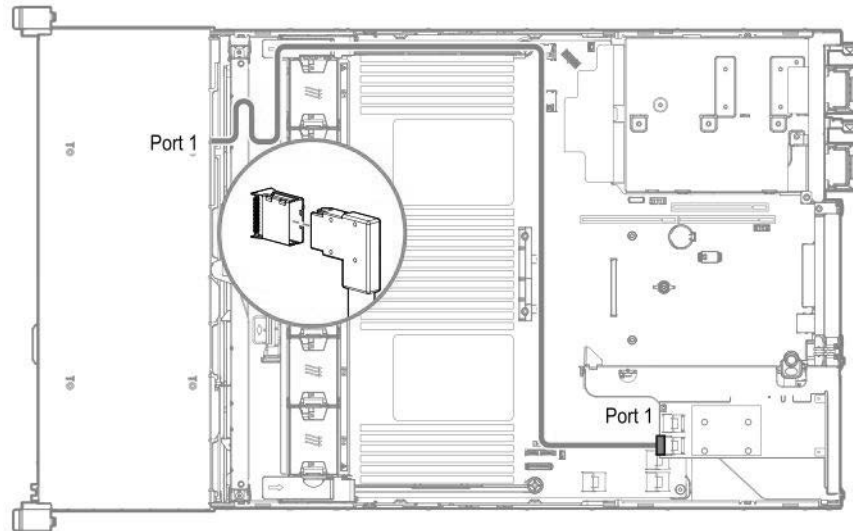
### Cable routing: Front 2SFF drive option for LFF

## Option 1: System board





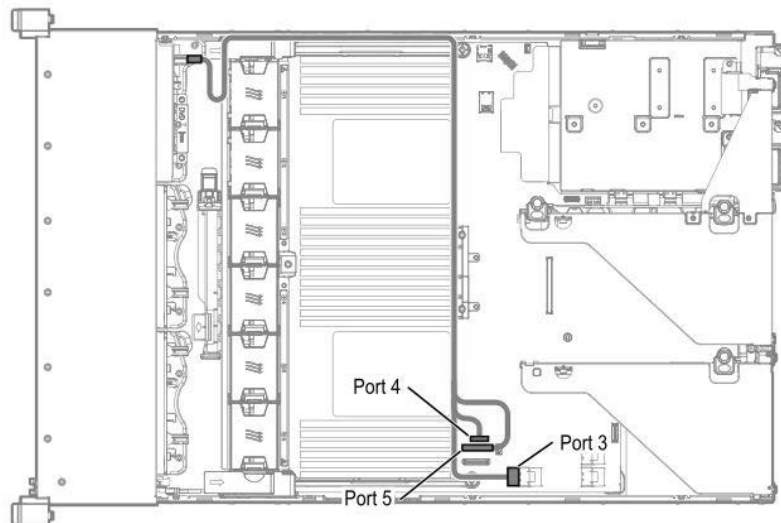
## Option 2: Controller



Option 3 (not shown): SAS Expander

## Cable routing: Front 2SFF drive options (3 position cable)

SFF models



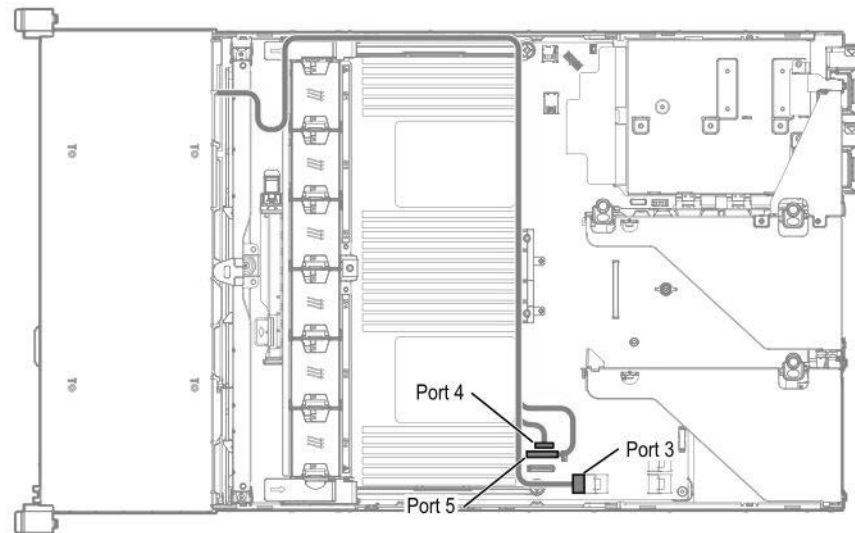


Figure 2: Front 4LFF drive cage 1 (2SFF option)

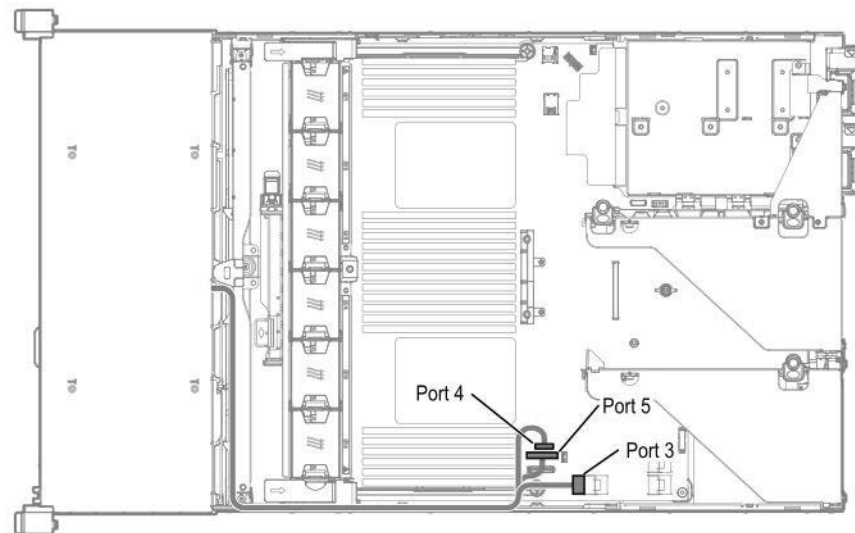


Figure 3: Front 4LFF drive cage 1

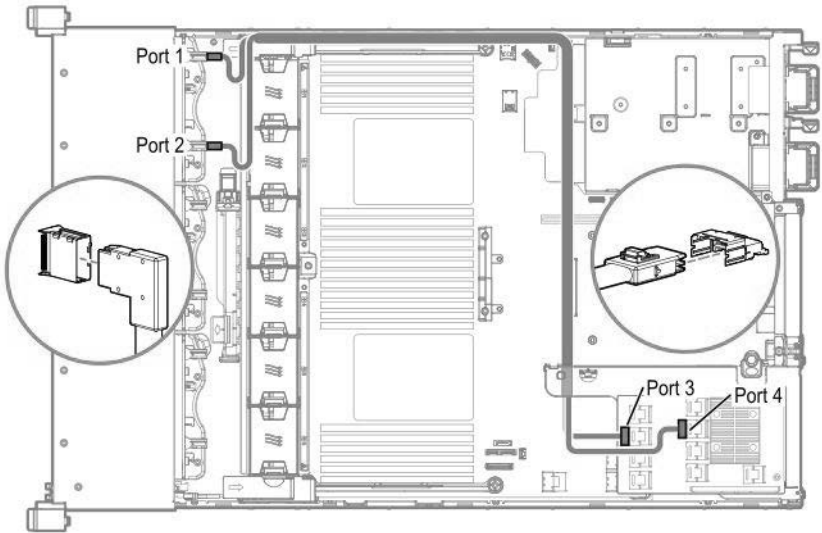
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**NOTE:** The Hitachi Advanced Server HA820 Mini-SAS 3-position cable kit (P/N 826709-B21) is required to support the 11th and 12th embedded SATA ports for 12LFF configurations.

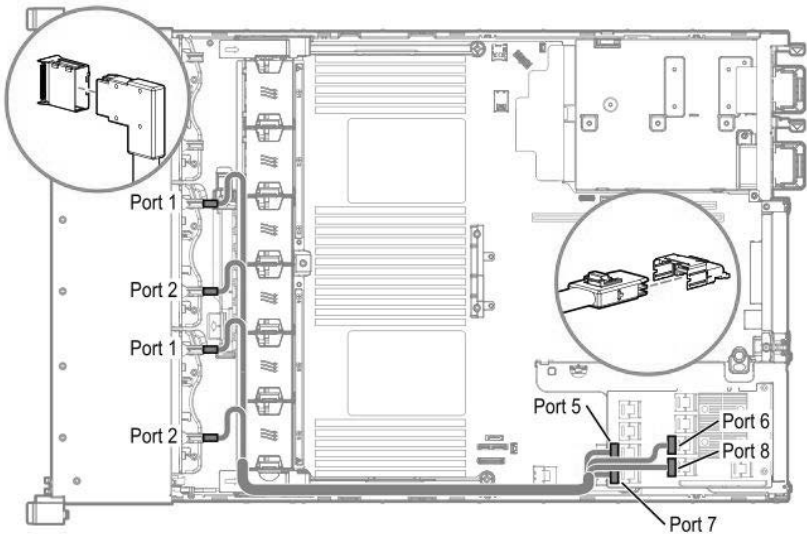
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Cable routing: Front 8SFF drive options

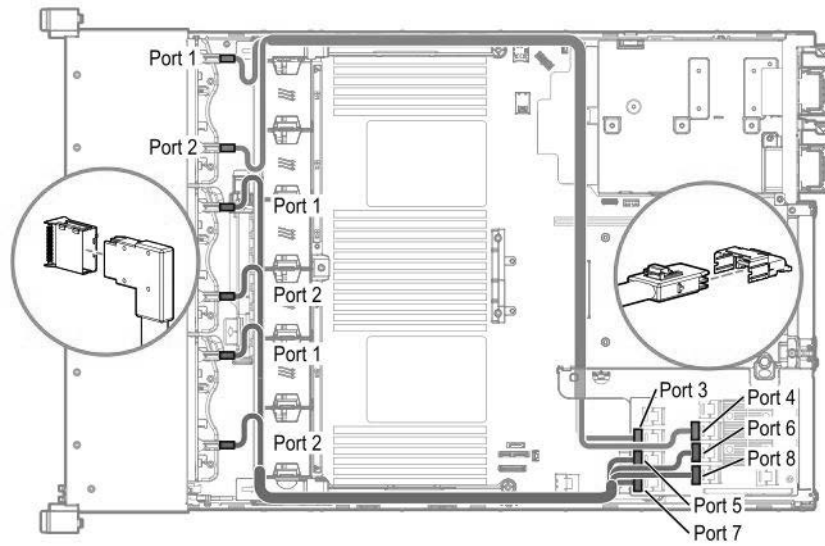
Box 1 to SAS Expander



Box 2 to SAS Expander

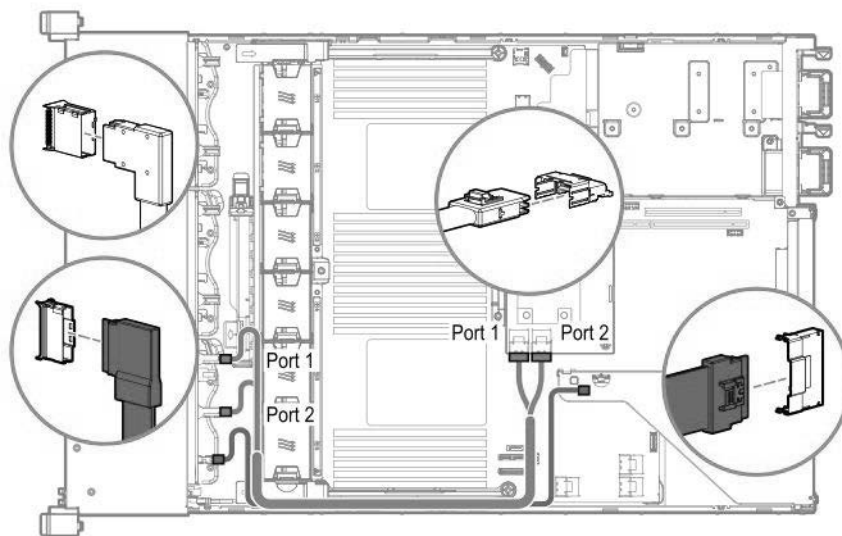


All boxes



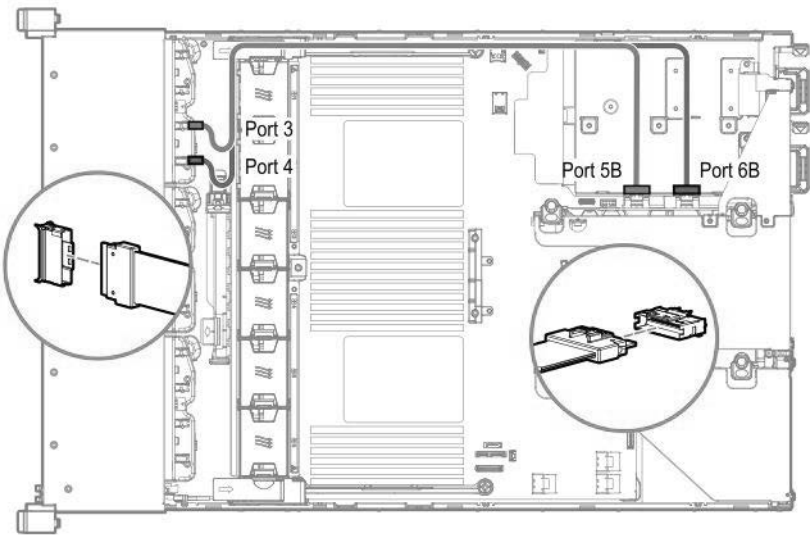
### Cable routing: Front 8SFF NVMe/SAS premium drive option

The backplane shown is in box 3.

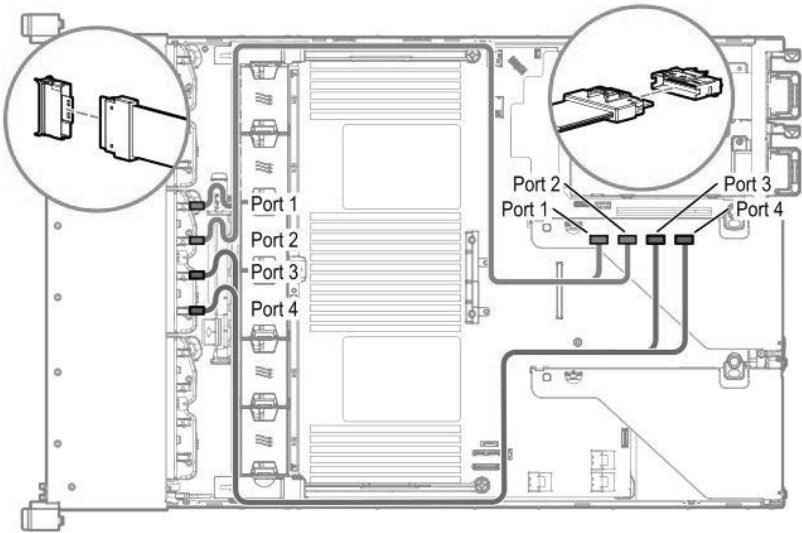


Cable routing: Front 8SFF NVMe drive options

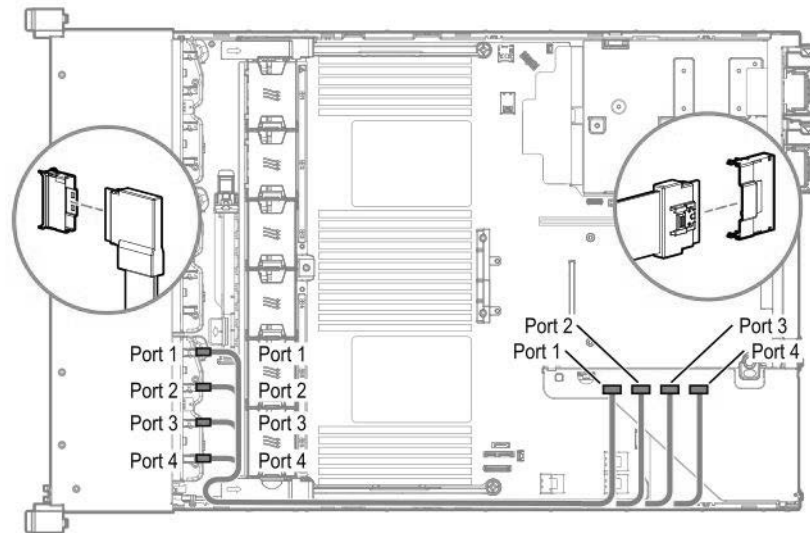
Box 1



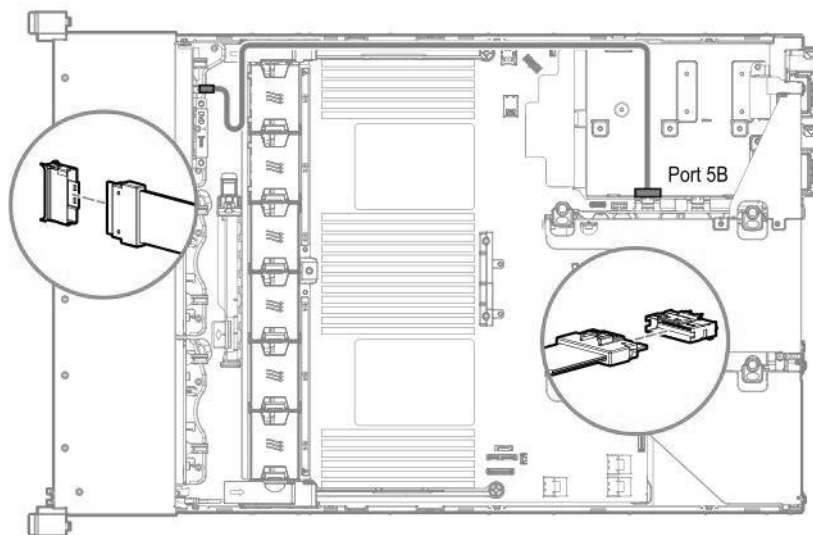
Box 2



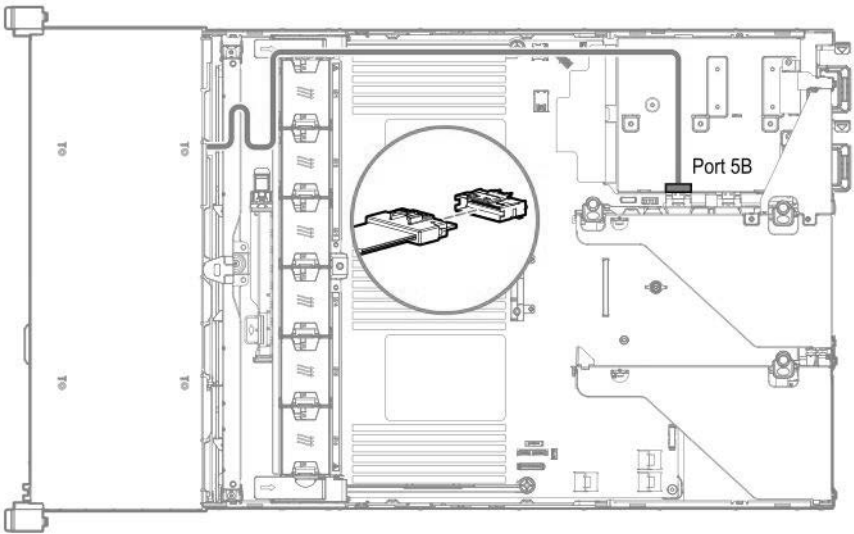
### Box 3



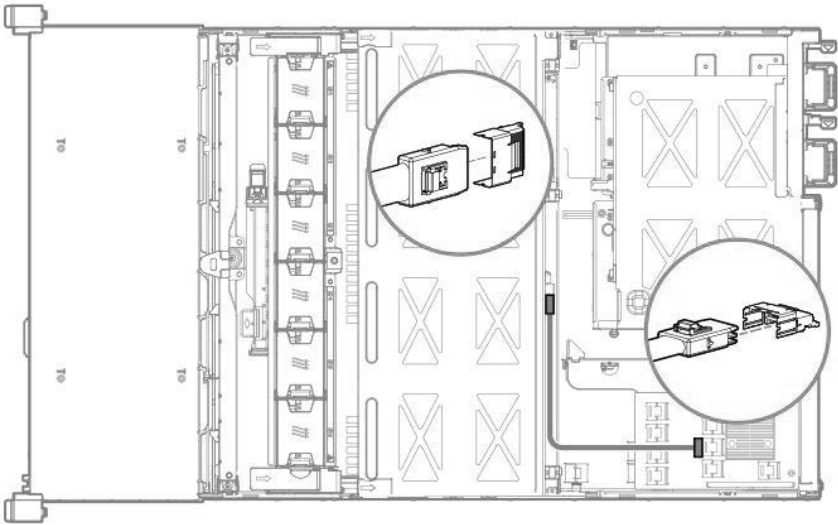
### Cable routing: Front 2SFF NVMe drive option for SFF



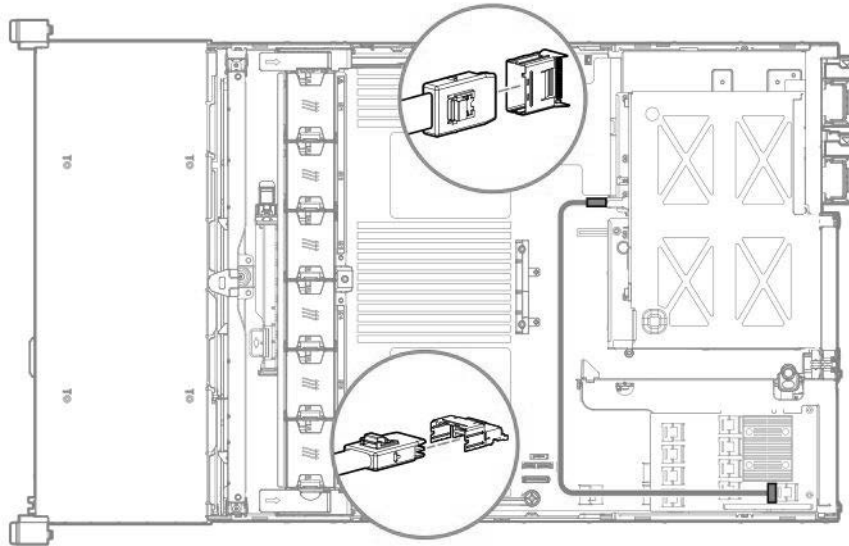
**Cable routing: Front 2SFF NVMe drive option for LFF**



**Cable routing: Midplane 4LFF drive option**

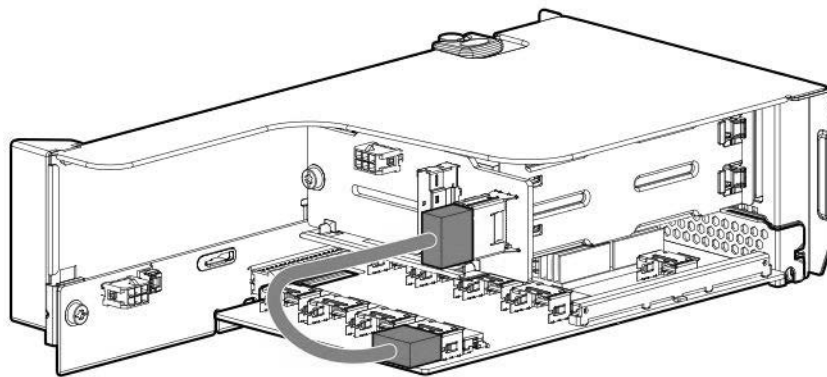


## Cable routing: Rear 3LFF drive option

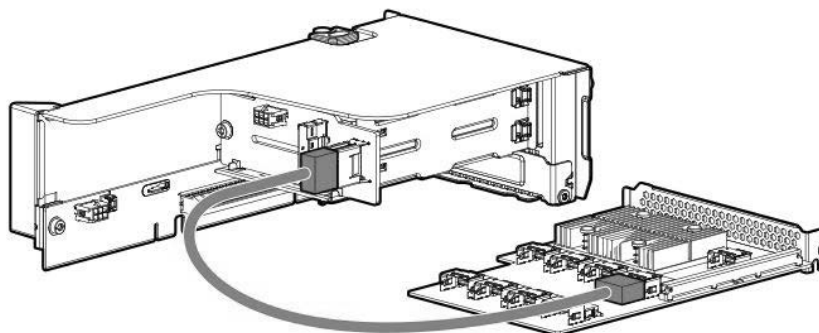


## Cable routing: Rear 2SFF drive options

Rear 2SFF drive option to a SAS expander, both in the primary slot

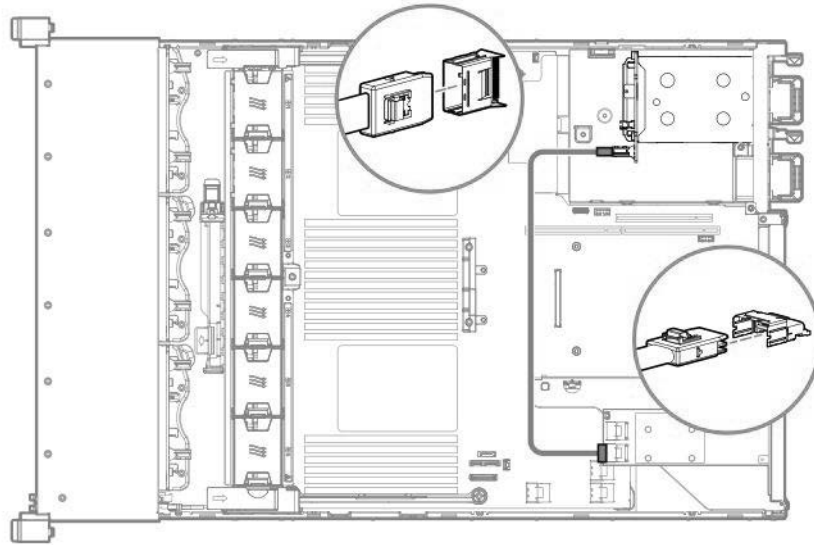


Rear 2SFF drive option in the secondary slot to a SAS Expander in primary slot





### Rear 2SFF drive option above the power supplies to a controller

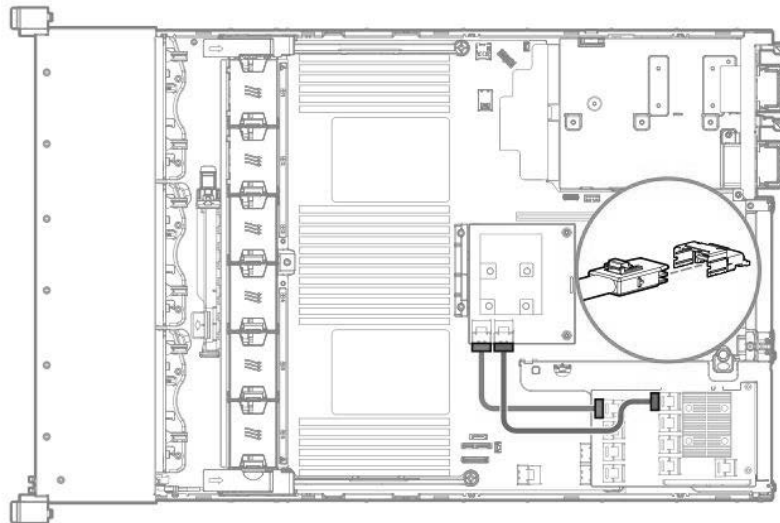


### Cable routing: 12G SAS Expander to a controller

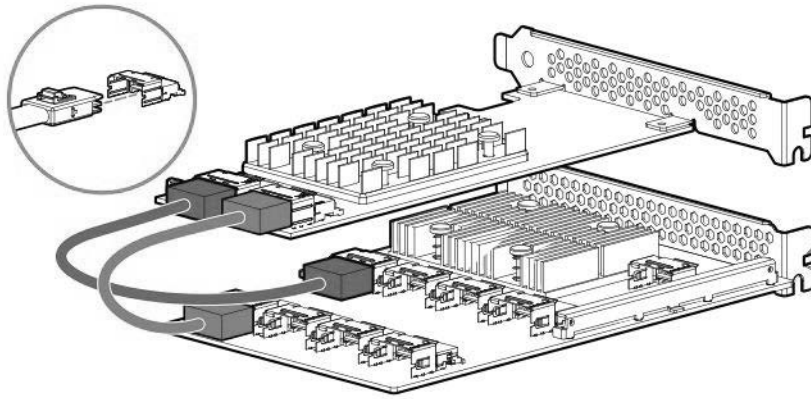
Observe the following:

- Port 1 always connects to port 1 of the controller.
- Port 2 always connects to port 2 of the controller.

### SAS expander to an a-type controller



### SAS expander to a p-type controller



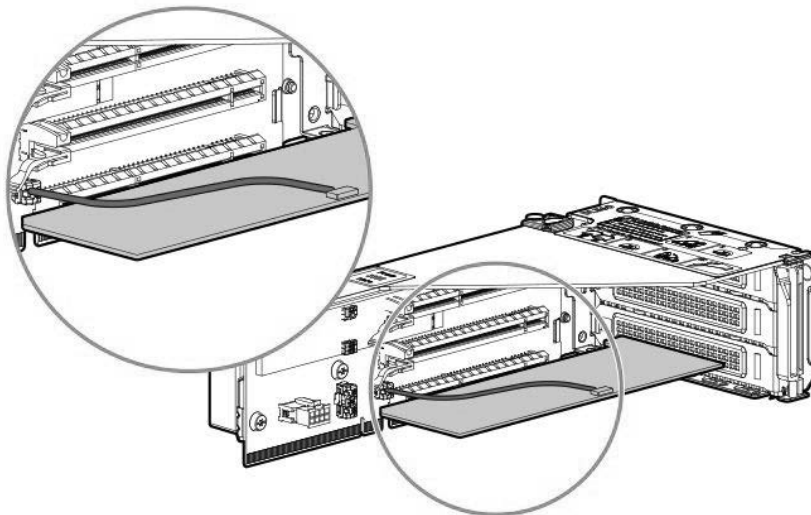
### Cable routing: Smart array P824i-P Controller

Observe the following:

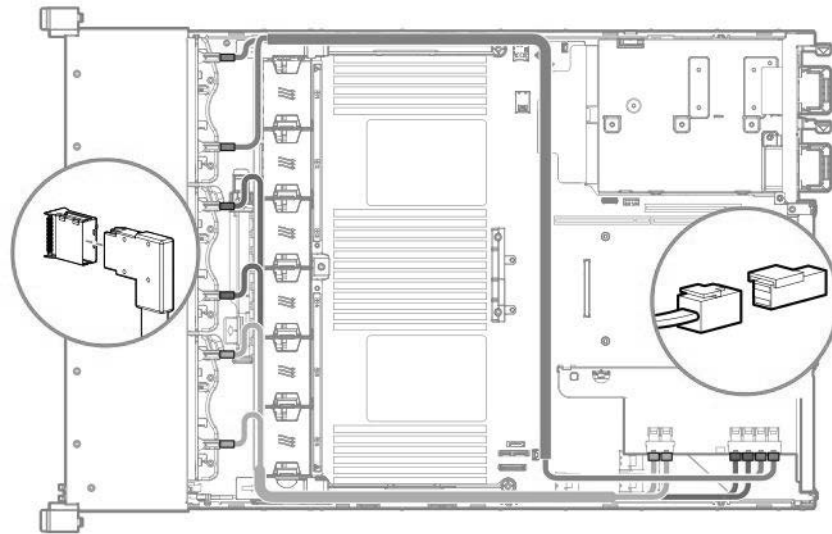
- Do not store excess cabling in the rear of the server. This blocks airflow and increases heat inside the server.
- Extra cable slack should be stored towards the front of the server, near the drive backplane.

#### Backup power cable

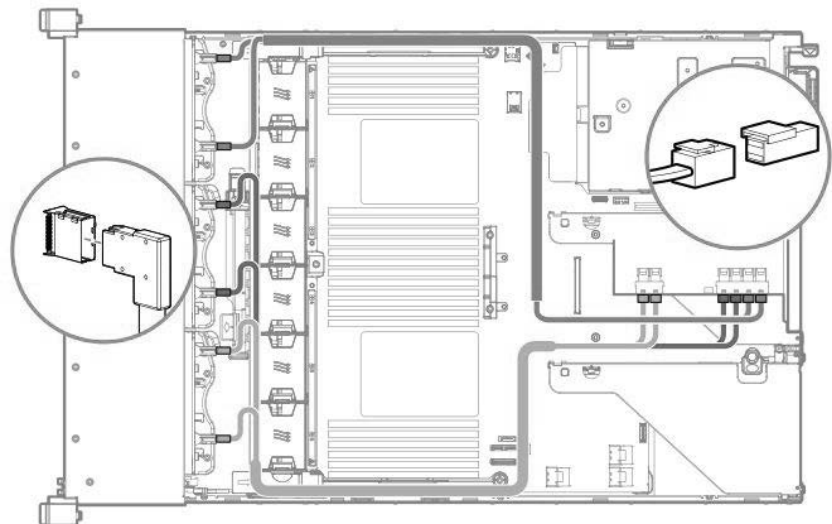
A smart storage battery is required with this controller. Your riser might look different from the one shown. To locate a backup power connector, see "[Riser board components](#)".



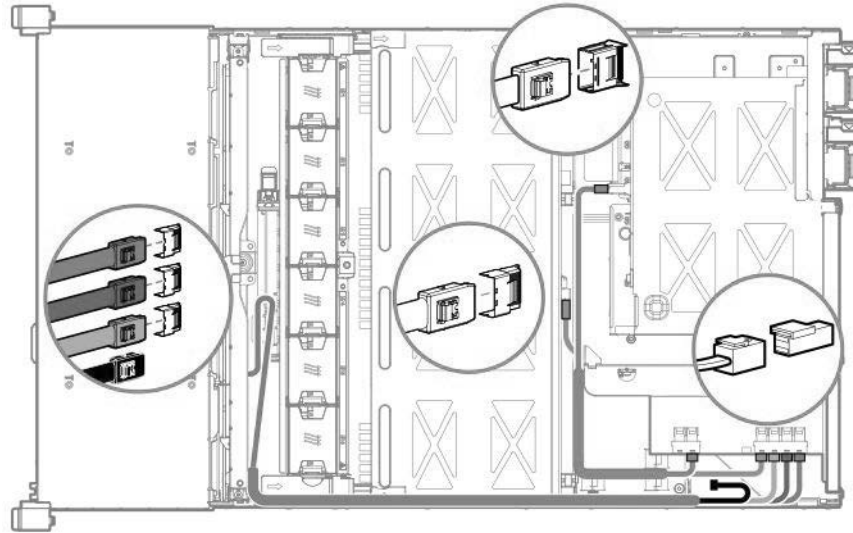
**24SFF with a smart array P824i-P controller in primary**



**24SFF with a smart array P824i-P controller in secondary**

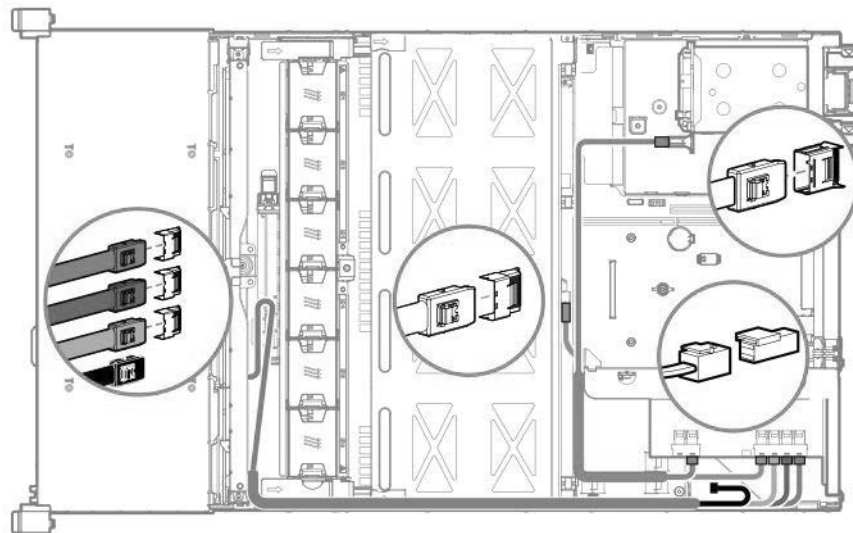


**Front 12LFF + Middle 4LFF + Rear 3LFF with the smart array P824i-P in the primary position**



\*One cable is left disconnected.

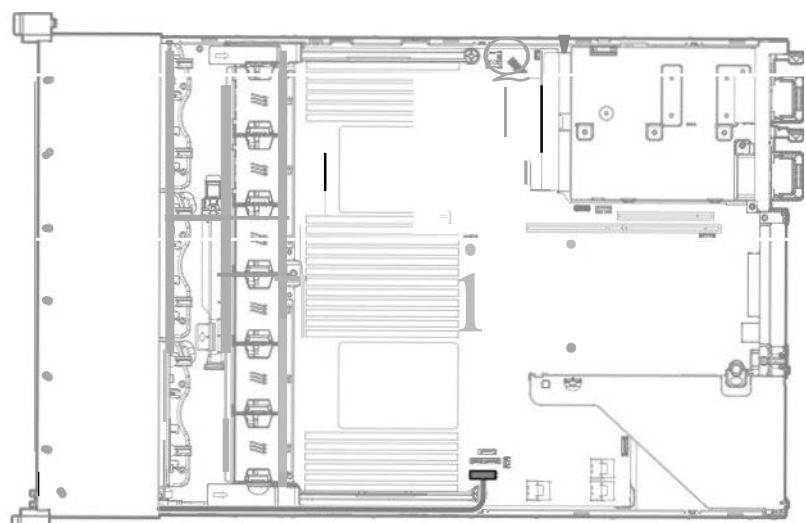
**Front 12LFF + Middle 4LFF + Rear 2SFF with the smart array P824i-P controller in the primary position**



\*One cable is left disconnected

# Cable routing: Systems Insight Display

An SFF model is shown. The routing is the same for LFF.



## Software and configuration utilities

### Server mode

The software and configuration utilities presented in this section operate in online mode, offline mode, or in both modes.

Software or configuration utility	Server mode
<u>iLO 5</u>	Online and Offline
<u>Smart Storage Administrator</u>	Online and Offline
<u>iLO RESTful API</u>	Online and Offline
<u>Intelligent Provisioning</u>	Online and Offline
<u>Service Pack for Advanced Server</u>	Online and Offline
<u>Smart update manager</u>	Online and Offline
<u>UEFI System Utilities</u>	Offline
<u>MR Storage Administrator</u>	Online
<u>StorCLI</u>	Online

# Active Health System

The Active Health System monitors and records changes in the server hardware and system configuration. The Active Health System provides:

- Continuous health monitoring of over 1600 system parameters
- Logging of all configuration changes
- Consolidated health and service alerts with precise time stamps
- Agentless monitoring that does not affect application performance

For more information about the Active Health System, see the iLO user guide at the following website:  
<https://knowledge.hitachivantara.com/Documents/Servers>.

## Active Health System data collection

The Active Health System does not collect information about your operations, finances, customers, employees, or partners. Examples of information that is collected:

- Server model and serial number
- Processor model and speed
- Storage capacity and speed
- Memory capacity and speed
- Firmware/BIOS and driver versions and settings

The Active Health System does not parse or change OS data from third-party error event log activities (for example, content created or passed through the OS).

## Active Health System Log

The data collected by the Active Health System is stored in the Active Health System Log. The data is logged securely, isolated from the operating system, and separate from customer data. Host resources are not consumed in the collection and logging of Active Health System data.

When the Active Health System Log is full, new data overwrites the oldest data in the log.

It takes less than 5 minutes to download the Active Health System Log and send it to a support professional to help you resolve an issue.

When you download and send Active Health System data to Hitachi Vantara, you agree to have the data used for analysis, technical resolution, and quality improvements. The data that is collected is managed according to the privacy statement, available at <https://www.hitachivantara.com/en-us/company/legal/privacy.html>.

# iLO 5

iLO 5 is a remote server management processor embedded on the system boards of Hitachi Advanced Server products. iLO enables the monitoring and controlling of servers from remote locations. iLO management is a powerful tool that provides multiple ways to configure, update, monitor, and repair servers remotely. iLO (Standard) comes preconfigured on Hitachi Advanced Server products without an additional cost or license.

Features that enhance server administrator productivity and additional new security features are licensed. For more information, see the iLO licensing guide at the following website:

<https://knowledge.hitachivantara.com/Documents/Servers>.

For more information about iLO, see the iLO user guide at the following website:

<https://knowledge.hitachivantara.com/Documents/Servers>.

## iLO Federation

iLO Federation enables you to manage multiple servers from one system using the iLO web interface.

When configured for iLO Federation, iLO uses multicast discovery and peer-to-peer communication to enable communication between the systems in iLO Federation groups.

When you navigate to one of the iLO Federation pages, a data request is sent from the iLO system running the web interface to its peers, and from those peers to other peers until all data for the selected iLO Federation group is retrieved.

iLO supports the following features:

- Group health status—View server health and model information.
- Group virtual media—Connect URL-based media for access by a group of servers.
- Group power control—Manage the power status of a group of servers.
- Group power capping—Set dynamic power caps for a group of servers.
- Group firmware update—Update the firmware of a group of servers.
- Group license installation—Enter a license key to activate iLO licensed features on a group of servers.
- Group configuration—Add iLO Federation group memberships for multiple iLO systems.

Any user can view information on iLO Federation pages, but a license is required for using the following features: Group virtual media, Group power control, Group power capping, Group configuration, and Group firmware update.

For more information about iLO Federation, see the iLO user guide at the following website:

<https://knowledge.hitachivantara.com/Documents/Servers>.

## iLO Service Port

The Service Port is a USB port with the label **iLO** on supported servers.

When you have physical access to a server, you can use the Service Port to do the following:

- Download the Active Health System Log to a supported USB flash drive.  
When you use this feature, the connected USB flash drive is not accessible by the host operating system.
- Connect a client (such as a laptop) with a supported USB to Ethernet adapter to access the following:
  - iLO web interface
  - Remote console

- iLO RESTful API
- CLI

Hitachi Vantara recommends the USB to Ethernet Adapter (part number Q7Y55A).

Some servers require an adapter to connect a USB to Ethernet adapter to the iLO Service Port. Hitachi Vantara recommends the Micro USB to USB Adapter (part number 789904-B21).

When you use the iLO Service Port:

- Actions are logged in the iLO event log.
- The server UID flashes to indicate the Service Port status.  
You can also retrieve the Service Port status by using a REST client and the iLO RESTful API.
- You cannot use the Service Port to boot any device within the server, or the server itself.
- You cannot access the server by connecting to the Service Port.
- You cannot access the connected device from the server.

For more information about the iLO Service Port, see the iLO user guide at the following website:  
<https://knowledge.hitachivantara.com/Documents/Servers>.

## iLO RESTful API

iLO includes the iLO RESTful API, which is Redfish API conformant. The iLO RESTful API is a management interface that server management tools can use to perform configuration, inventory, and monitoring tasks by sending basic HTTPS operations (GET, PUT, POST, DELETE, and PATCH) to the iLO web server.

To learn more about the iLO RESTful API, see the Hitachi Vantara website (<https://knowledge.hitachivantara.com/Documents/Servers>).

For specific information about automating tasks using the iLO RESTful API, contact customer support.

## RESTful Interface Tool

The RESTful Interface Tool (iLOREST) is a scripting tool that allows you to automate Advanced Server product management tasks. It provides a set of simplified commands that take advantage of the iLO RESTful API. You can install the tool on your computer for remote use or install it locally on a server with a Windows or Linux Operating System. The RESTful Interface Tool offers an interactive mode, a scriptable mode, and a file-based mode similar to CONREP to help decrease automation times.



# Intelligent Provisioning

Intelligent Provisioning is a single-server deployment tool embedded in Advanced Server products. Intelligent Provisioning simplifies server setup, providing a reliable and consistent way to deploy servers.

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**NOTE:** After you have selected a mode, you must reprovision the server to change the mode that launches when you boot to F10.

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Intelligent Provisioning prepares the system for installing original, licensed vendor media and Hitachi Vantara- branded versions of OS software. Intelligent Provisioning also prepares the system to integrate optimized server support software from the Service Pack for Advanced Server (SPV). SPV is a comprehensive systems software and firmware solution for Advanced Server products, their enclosures. These components are preloaded with a basic set of firmware and OS components that are installed along with Intelligent Provisioning.

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After the server is running, you can update the firmware to install additional components. You can also update any components that have been outdated since the server was manufactured.

To access Intelligent Provisioning:

- Press **F10** from the POST screen and enter Intelligent Provisioning.
- From the iLO web interface using **Always On**. **Always On** allows you to access Intelligent Provisioning without rebooting your server.

## Intelligent Provisioning operation

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**NOTE:** Intelligent Provisioning 3.40 and later requires iLO firmware version 2.10.

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Intelligent Provisioning includes the following components:

- Critical boot drivers
- Active Health System (AHS)
- Erase Utility
- Deployment Settings

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### **IMPORTANT:**

- Although your server is preloaded with firmware and drivers, Hitachi Vantara recommends updating the firmware upon initial setup. Also, downloading and updating the latest version of Intelligent Provisioning ensures the latest supported features are available.
  - For Advanced Server products, firmware is updated using the Intelligent Provisioning Firmware Update utility.
  - Do not update firmware if the version you are currently running is required for compatibility.
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**NOTE:** Intelligent Provisioning does not function within multihomed configurations. A multihomed host is one that is connected to two or more networks or has two or more IP addresses.

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Intelligent Provisioning provides installation help for the following operating systems:

- Microsoft Windows Server
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi/vSphere Custom Image
- ClearOS

Not all versions of an OS are supported. For information about specific versions of a supported operating system, see the OS Support Matrix on the Hitachi Vantara website

(<https://support.hitachivantara.com/en/user/answers/interoperability.html>).

## Management security

HA800 and Hitachi Advanced Server are built with some of the industry's most advanced security capabilities, out of the box, with a foundation of secure embedded management applications and firmware. The management security provided by embedded management products enables secure support of modern workloads, protecting your components from unauthorized access and unapproved use. The range of embedded management and optional software and firmware available with the iLO Advanced license provides security features that help ensure protection, detection, and recovery from advanced cyber attacks. For more information, see the *Hitachi Advanced Server HA800 Security Reference Guide* on the Hitachi Vantara at <https://knowledge.hitachivantara.com/Documents/Servers>.

# UEFI System Utilities

The UEFI System Utilities is embedded in the system ROM. Its features enable you to perform a wide range of configuration activities, including:

- Configuring system devices and installed options.
- Enabling and disabling system features.
- Displaying system information.
- Selecting the primary boot controller or partition.
- Configuring memory options.
- Launching other preboot environments.

Advanced Server products with UEFI can provide:

- Support for boot partitions larger than 2.2 TB. Such configurations could previously only be used for boot drives when using RAID solutions.
- Secure Boot that enables the system firmware, option card firmware, operating systems, and software collaborate to enhance platform security.
- UEFI Graphical User Interface (GUI)
- An Embedded UEFI Shell that provides a preboot environment for running scripts and tools.
- Boot support for option cards that only support a UEFI option ROM.

## Selecting the boot mode

This server provides two **Boot Mode** configurations: UEFI Mode and Legacy BIOS Mode. Certain boot options require that you select a specific boot mode. By default, the boot mode is set to **UEFI Mode**. The system must boot in **UEFI Mode** to use certain options, including:

- Secure Boot, UEFI Optimized Boot, Generic USB Boot, IPv6 PXE Boot, iSCSI Boot, and Boot from URL
- Fibre Channel/FCoE Scan Policy

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**NOTE:** The boot mode you use must match the operating system installation. If not, changing the boot mode can impact the ability of the server to boot to the installed operating system.

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### Prerequisite

When booting to **UEFI Mode**, leave **UEFI Optimized Boot** enabled.

### Procedure

1. From the **System Utilities** screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > Boot Options > Boot Mode**.
2. Select a setting.
  - **UEFI Mode** (default)—Configures the system to boot to a UEFI compatible operating system.
  - **Legacy BIOS Mode**—Configures the system to boot to a traditional operating system in Legacy BIOS compatibility mode.

3. Save your setting.
4. Reboot the server.

## Secure Boot

Secure Boot is a server security feature that is implemented in the BIOS and does not require special hardware. Secure Boot ensures that each component launched during the boot process is digitally signed and that the signature is validated against a set of trusted certificates embedded in the UEFI BIOS. Secure Boot validates the software identity of the following components in the boot process:

- UEFI drivers loaded from PCIe cards
- UEFI drivers loaded from mass storage devices
- Preboot UEFI Shell applications
- OS UEFI boot loaders

When Secure Boot is

enabled:

- Firmware components and operating systems with boot loaders must have an appropriate digital signature to execute during the boot process.
- Operating systems must support Secure Boot and have an EFI boot loader signed with one of the authorized keys to boot. For more information about supported operating systems, see <https://support.hitachivantara.com/en/user/answers/interoperability.html>.

You can customize the certificates embedded in the UEFI BIOS by adding or removing your own certificates, either from a management console directly attached to the server, or by remotely connecting to the server using the iLO Remote Console.

You can configure Secure Boot:

- Using the **System Utilities** options described in the following sections.
- Using the iLO RESTful API to clear and restore certificates. For more information, contact customer support.
- Using the `secboot` command in the Embedded UEFI Shell to display Secure Boot databases, keys, and security reports.

## Launching the Embedded UEFI Shell

Use the **Embedded UEFI Shell** option to launch the Embedded UEFI Shell. The Embedded UEFI Shell is a preboot command-line environment for scripting and running UEFI applications, including UEFI boot loaders. The Shell also provides CLI-based commands you can use to obtain system information, and to configure and update the system BIOS.

### Prerequisites

**Embedded UEFI Shell** is set to **Enabled**.

### Procedure

1. From the **System Utilities** screen, select **Embedded Applications > Embedded UEFI**

**Shell.** The **Embedded UEFI Shell** screen appears.

2. Press any key to acknowledge that you are physically present.

This step ensures that certain features, such as disabling **Secure Boot** or managing the **Secure Boot** certificates using third-party UEFI tools, are not restricted.

3. If an administrator password is set, enter it at the prompt and press

**Enter.** The `Shell>` prompt appears.

4. Enter the commands required to complete your task.

5. Enter the `exit` command to exit the Shell.

## Smart Storage Administrator

SSA is the main tool for configuring arrays on smart array SR controllers. It exists in three interface formats: the SSA GUI, the SSA CLI, and SSA Scripting. All formats provide support for configuration tasks. Some of the advanced tasks are available in only one format.

The diagnostic features in SSA are also available in the standalone software Smart Storage Administrator Diagnostics Utility CLI.

During the initial provisioning of the server, an array is required to be configured before the operating system can be installed. You can configure the array using SSA.

SSA is accessible both offline (either through Intelligent Provisioning or as a standalone bootable ISO image) and online:

- Accessing SSA in the offline environment

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**!** **IMPORTANT:** If you are updating an existing server in an offline environment, obtain the latest version of SSA through Service Pack for Advanced Server before performing configuration procedures.

---

Using one of multiple methods, you can run SSA before launching the host operating system. In offline mode, users can configure or maintain detected and supported devices, such as optional smart array controllers and integrated smart array controllers. Some SSA features are only available in the offline environment, such as setting the boot controller and boot volume.

- Accessing SSA in the online environment

This method requires an administrator to download the SSA executables and install them. You can run SSA online after launching the host operating system.

For more information, see *Smart array SR Configuration Guide*.

# MR Storage Administrator

MR Storage Administrator is a web-based application that enables you to monitor, configure, maintain, and troubleshoot the smart array MR controller. MR Storage Administrator enables you to view, create, and manage storage configurations.

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❗ **IMPORTANT:** The MR Storage Administrator manages **only** the smart array MR controllers. It does not manage smart array SR controllers.

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- **Monitoring and configuring:** MR Storage Administrator enables you to monitor the controllers and configure the drives on the controller. It displays the status of the controller cards, logical drives, and drives on the controller. The device status icons notify you if there are drive failures and other events that require your immediate attention. Email notifications about the status of the server are sent based on your alert settings. The system errors and events are recorded and displayed in an event log file. You can also import or clear foreign configurations.

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❗ **IMPORTANT:** Limited alerting and monitoring is available through iLO when Agentless Management Service is installed. The smart array P824i-p MR controller supports limited alerts through iLO using the AMS agent.

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- **Maintaining:** Using MR Storage Administrator, you can perform system maintenance tasks, such as updating the controller firmware.
- **Troubleshooting:** MR Storage Administrator displays information related to drive failures, device failures, and other issues. It also provides recommendations and displays contextual links, helping you to locate the drives/devices that have issues and troubleshoot them. You can also download a report of the devices and their configurations, properties, and settings and send it to Hitachi Vantara Support for further troubleshooting.

Obtain MR Storage Administrator installation files through the Service Pack for Advanced Server, or SPV, which you can download from the Hitachi Vantara website

(<https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>). Be sure to use the latest SPV version for the server.

## StorCLI

The Storage Command Line Interface (StorCLI) tool is the command line management software designed for the smart array MR controller. StorCLI is a command line interface that is designed to be easy to use, consistent, and easy to script.

Obtain StorCLI through the Service Pack for Advanced Server, or SPV, which you can download from <https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>. Be sure to use the latest SPV version for the server.

## USB support

HA800 and servers support all USB operating speeds depending on the device that is connected to the server.

### External USB functionality

Hitachi Vantara provides external USB support to enable local connection of USB devices for server administration, configuration, and diagnostic procedures.

For additional security, external USB functionality can be disabled through USB options in UEFI System Utilities.

# Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a single ROM that acts as two separate ROM images. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

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**NOTE:** The server ships with the same version programmed on each side of the ROM.

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## Safety and security benefits

When you flash the system ROM, the flashing mechanism writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

## Keeping the system current

### Updating firmware or system ROM

To update firmware or system ROM, use one of the following methods:

- The **Firmware Update** option in the System Utilities.
- The `fwupdate` command in the **Embedded UEFI Shell**.
- Service Pack for Advanced Server (SPV)
- Online flash components
- Moonshot Component Pack

### Service Pack for Advanced Server

SPV is a systems software and firmware solution delivered as a single ISO file download. This solution uses smart update manager as the deployment tool and is tested and supports Hitachi Advanced Server products and infrastructure.

SPV, along with smart update manager and SUT, provides Smart Update system maintenance tools that systematically update Hitachi Advanced Server products and infrastructure.

SPV can be used in an online mode on a server running Windows, Linux, or VMware vSphere ESXi, or in an offline mode where the server is booted to an operating system included in the ISO file.

The SPV is also available for download from the SPV download page at <https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>.

### Smart update manager

SUM is an innovative tool for maintaining and updating the firmware, drivers, and system software of Hitachi Advanced Server products, infrastructure, and associated options.

SUM identifies associated nodes you can update at the same time to avoid interdependency issues. Key features of SUM include:

- Discovery engine that finds installed versions of hardware, firmware, and software on nodes.
- SUM deploys updates in the correct order and ensures that all dependencies are met before deploying an update.

- Interdependency checking.
- Automatic and step-by-step Localhost Guided Update process.
- Web browser-based user interface.
- Ability to create custom baselines and ISOs.
- Support for iLO Repository (HA800 or later iLO 5 nodes only).
- Simultaneous firmware and software deployment for multiple remote nodes.
- Local offline firmware deployments with SPV deliverables.
- Extensive logging in all modes.

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**NOTE:** SUM does not support third-party controllers, including flashing hard drives behind the controllers.

## Updating firmware from the System Utilities

Use the **Firmware Updates** option to update firmware components in the system, including the system BIOS, NICs, and storage cards.

### Procedure

1. Access the System ROM Flash Binary component for your server from the Hitachi Vantara Support Center.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. Launch the **System Utilities**, and select **Embedded Applications > Firmware Update**.
5. Select a device.

The **Firmware Updates** screen lists details about your selected device, including the current firmware version in use.

6. Select **Select Firmware File**.
7. Select the flash file in the **File Explorer** list.

The firmware file is loaded and the **Firmware Updates** screen lists details of the file in the **Selected firmware file** field.

8. Select **Image Description**, and then select a firmware image. A device can have multiple firmware images.
9. Select **Start firmware update**.

## Updating the firmware from the UEFI Embedded Shell

### Procedure

1. Access the System ROM Flash Binary component for your server from the Hitachi Vantara Support Center (<https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>).
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.




4. Boot to the UEFI Embedded Shell.
5. To obtain the assigned file system volume for the USB key, enter `map -r`.
6. Change to the file system that contains the System ROM Flash Binary component for your server. Enter one of the `fsx` file systems available, such as `fs0:` or `fs1:`, and press **Enter**.
7. Use the `cd` command to change from the current directory to the directory that contains the binary file.
8. Flash the system ROM by entering `fwupdate -d BIOS -f filename`.
9. Reboot the server. A reboot is required after the firmware update in order for the updates to take effect and for hardware stability to be maintained.

## Online Flash components

This component provides updated system firmware that can be installed directly on supported operating systems. Additionally, when used in conjunction with SUM, this Smart Component allows the user to update firmware on remote servers from a central location. This remote deployment capability eliminates the need for the user to be physically present at the server to perform a firmware update.

## Drivers

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 **IMPORTANT:** Always perform a backup before installing or updating device drivers.

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Update drivers using any of the following **Smart Update Solutions**:

- Download the latest Service Pack for Advanced Server (includes smart update manager)
- Create a custom SPV download
- Download smart update manager for Linux
- Download specific drivers

To locate the drivers for a server, go to

<https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>, and then search for the product name/number.

## Software and firmware

Update software and firmware before using the server for the first time, unless any installed software or components require an older version.

For system software and firmware updates, use one of the following sources:

- Download the SPV from the Hitachi Vantara website  
(<https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>).
- Download individual drivers, firmware, or other system software components from the server product page in the Hitachi Vantara Support Center website  
(<https://support.hitachivantara.com/en/user/answers/downloads.html#hardware-download>).

## Operating system version support

For information about specific versions of a supported operating system, see <https://support.hitachivantara.com/en/user/answers/interoperability.html>.

# Troubleshooting

## NMI functionality

An NMI crash dump enables administrators to create crash dump files when a system is hung and not responding to traditional debugging methods.

An analysis of the crash dump log is an essential part of diagnosing reliability problems, such as hanging operating systems, device drivers, and applications. Many crashes freeze a system, and the only available action for administrators is to cycle the system power. Resetting the system erases any information that could support problem analysis, but the NMI feature preserves that information by performing a memory dump before a hard reset.

To force the OS to initiate the NMI handler and generate a crash dump log, the administrator can use the iLO Generate NMI feature.

## Troubleshooting resources

Troubleshooting resources are available for HA800 and server products in the following documents:

- *Troubleshooting Guide for Hitachi Advanced Server HA800* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance.
- *Error Message Guide for Hitachi Advanced Server HA800* provides a list of error messages and information to assist with interpreting and resolving error messages.

To access troubleshooting resources for your product, see the Hitachi Vantara:

- For HA800 servers, see [https://knowledge.hitachivantara.com/Documents/Servers/Advanced\\_Server](https://knowledge.hitachivantara.com/Documents/Servers/Advanced_Server).

# Battery replacement

If the server no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock.

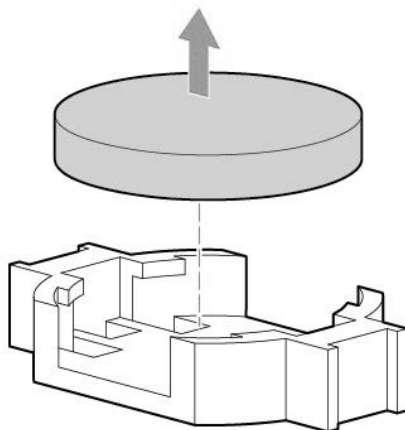
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**⚠ WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
  - Do not expose the battery to temperatures higher than 60°C (140°F).
  - Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
  - Replace only with the spare designated for this product.
- 

To remove the component:

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. If installed, **remove the secondary PCIe riser cage.**
6. Locate the battery.
7. Remove the battery.



For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

# Specifications

## Environmental specifications

Specification	Value
<b>Temperature range</b> <sup>1</sup>	—
Operating	10°C to 35°C (50°F to 95°F)
Nonoperating	-30°C to 60°C (-22°F to 140°F)
<b>Relative humidity (noncondensing)</b> —	
Operating	Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity  Maximum to be 24°C (75.2°F) dew point or 90% relative humidity
Nonoperating	5% to 95%  38.7°C (101.7°F), maximum wet bulb temperature

<sup>1</sup> All temperature ratings shown are for sea level. An altitude derating of 1.0°C per 304.8 m (1.8°F per 1000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Maximum rate of change is 20°C per hour (36°F per hour). The upper limit and rate of change might be limited by the type and number of options installed.

For certain approved hardware configurations, the supported system inlet temperature range is extended:

- 5°C to 10°C (41°F to 50°F) and 35°C to 40°C (95°F to 104°F) at sea level with an altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).
- 40°C to 45°C (104°F to 113°F) at sea level with an altitude derating of 1.0°C per every 125 m (1.8°F per every 410 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).

For information about approved hardware configurations, contact customer support.

## Mechanical specifications

Specification	Value
Height	8.73 cm (3.44 in)
Depth, SFF	67.94 cm (26.75 in)
Depth, LFF	73.02 cm (28.75 in)
Width	44.54 cm (17.54 in)
Weight, SFF minimum	14.9 kg (32.75 lbs)
Weight, SFF maximum	19.5kg (43.00 lbs)

*Table Continued*

Specification	Value
Weight, LFF minimum	17.1 kg (37.75 lbs)
Weight, LFF maximum	24.5 kg (54 lbs)

## Power supply specifications

Depending on the installed options and the regional location where the server was purchased, the server can be configured with one of the following power supplies:

- [500W Flex Slot Platinum Hot-plug Low Halogen Power Supply](#)
- [800W Flex Slot Platinum Hot-plug Low Halogen Power Supply](#)
- [800W Flex Slot Titanium Hot-plug Low Halogen Power Supply](#)
- [800W Flex Slot Universal Hot-plug Low Halogen Power Supply](#)
- [800W Flex Slot -48VDC Hot-plug Low Halogen Power Supply](#)
- [800W Flex Slot Scalable Persistent Memory Power Supply](#)
- [1600W Flex Slot Platinum Hot-plug Low Halogen Power Supply](#)

### 500W Flex Slot Platinum Hot-plug Low Halogen Power Supply

Specification	Value
Input requirements	—
Rated input voltage	100 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	5.6 A at 100 VAC 2.7 A at 200 VAC 2.3 A at 240 VDC for China only
Maximum rated input power	557 W at 100 VAC 539 W at 200 VAC 537 W at 240 VDC for China only

*Table Continued*

Specification	Value
BTUs per hour	1902 at 100 VAC 1840 at 200 VAC 1832 at 240 VDC for China only
<b>Power supply output</b> —	
Rated steady-state power	500 W at 100 VAC to 127 VAC input 500 W at 100 VAC to 240 VAC input 500 W at 240 VDC input for China only
Maximum peak power	500 W at 100 VAC to 127 VAC input 500 W at 100 VAC to 240 VAC input 500 W at 240 VDC input for China only

## 800W Flex Slot Platinum Hot-plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b> —	
Rated input voltage	100 VAC to 127 VAC 200 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	9.1 A at 100 VAC 4.4 A at 200 VAC 3.6 A at 240 VDC for China only
Maximum rated input power	899 W at 100 VAC 867 W at 200 VAC 864 W at 240 VDC for China only
BTUs per hour	3067 at 100 VAC 2958 at 200 VAC 2949 at 240 VAC for China only

Table

Specification	Value
<b>Power supply output</b>	—
Rated steady-state power	800 W at 100 VAC to 127 VAC input 800 W at 100 VAC to 240 VAC input 800 W at 240 VDC input for China only
Maximum peak power	800 W at 100 VAC to 127 VAC input 800 W at 100 VAC to 240 VAC input 800 W at 240 VDC input for China only

## 800W Flex Slot Titanium Hot-plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	—
Rated input voltage	200 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	4.35 A at 200 VAC 3.62 A at 240 VAC 3.62 A at 240 VDC for China only
Maximum rated input power	851 W at 200 VAC 848 W at 240 VAC 848 W at 240 VDC for China only
BTUs per hour	2905 at 200 VAC 2893 at 240 VAC 2893 at 240 VDC for China only
<b>Power supply output</b>	—
Rated steady-state power	800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only

Table

Maximum peak power

800 W at 200 VAC to 240 VAC input  
800 W at 240 VDC input for China  
only

## 800W Flex Slot Universal Hot-plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	—
Rated input voltage	200 VAC to 277 VAC 380 VDC
Rated input frequency	50 Hz to 60 Hz
Rated input current	4.4 A at 200 VAC 3.1 A at 277 VAC 2.3 A at 380 VDC
Maximum rated input power	869 W at 200 VAC 865 W at 230 VAC 861 W at 277 VAC 863 W at 380 VDC
BTUs per hour	2964 at 200 VAC 2951 at 230 VAC 2936 at 277 VAC 2943 at 380 VDC
<b>Power supply output</b>	—
Rated steady-state power	800 W at 200 VAC to 277 VAC input
Maximum peak power	800 W at 200 VAC to 277 VAC input

Table



## 800W Flex Slot -48VDC Hot-plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	—
Rated input voltage	-40 VDC to -72 VDC -48 VDC nominal input
Rated input current	22.1 A at -40 VDC input 18.2 A at -48 VDC input, nominal input 12.0 A at -72 VDC input
<b>Specification</b>	<b>Value</b>
Rated input power (W)	874 W at -40 VDC input 865 W at -48 VDC input, nominal input 854 W at -72 VDC input
Rated input power (BTUs per hour)	2983 at -40 VDC input 2951 at -48 VDC input, nominal input 2912 at -72 VDC input
<b>Power supply output</b>	—
Rated steady-state power (W)	800 W at -40 VDC to -72 VDC
Maximum peak power (W)	800 W at -40 VDC to -72 VDC
Maximum peak power	800 W at -40 VDC to -72 VDC input



**WARNING:** To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel.
- Connect the equipment to a reliably grounded secondary circuit source. A secondary circuit has no direct connection to a primary circuit and derives its power from a transformer, converter, or equivalent isolation device.
- The branch circuit overcurrent protection must be rated 27 A.



**CAUTION:** This equipment is designed to permit the connection of the earthed conductor of the DC supply circuit to the earthing conductor at the equipment.

If this connection is made, all of the following must be met:

- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a

bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.

- This equipment must be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system must be earthed elsewhere.
- The DC supply source is to be located within the same premises as the equipment.
- Switching or disconnecting devices must not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

## 800W Flex Slot Scalable Persistent Memory Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	100 VAC to 127 VAC
	200 VAC to 240 VAC
	240 VDC for China only
Rated input frequency	50 Hz to 60 Hz
	Not applicable to 240 VDC
Rated input current	5.8 A at 100 VAC
	4.5 A at 200 VAC
	3.8 A at 240 VDC for China only
Maximum rated input power	580 W at 100
	VAC 900 W at
	200 VAC
	912 W at 240 VDC for China only
BTUs per hour	1,979 at 100 VAC
	3,071 at 240 VAC
	3,112 at 240 VDC for China only
<b>Power supply output</b>	
Rated steady-state power	500 W at 100 VAC to 127 VAC input
	800 W at 200 VAC to 240 VAC input
	800 W at 240 VDC input for China
	only

Maximum peak power	500 W at 90 VAC to 132 VAC input
	800 W at 180 VAC to 264 VAC input
	800 W at 240 VDC input for China
	only

## 1600W Flex Slot Platinum Hot-plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	200 VAC to 240 VAC
	240 VDC for China only
Rated input frequency	50 Hz to 60 Hz
Rated input current	8.7 A at 200 VAC
	7.2 A at 240 VAC
Maximum rated input power	1734 W at 200
	VAC 1725 W at
	240 VAC
BTUs per hour	5918 at 200 VAC
	5884 at 240 VAC
<b>Power supply output</b>	
Rated steady-state power	1600 W at 200 VAC to 240 VAC
	input 1600 W at 240 VDC input
Maximum peak power input	2200 W for 1 ms (turbo mode) at 200 VAC to 240 VAC

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